



# A Public Health Crisis

The Health Cost of Gun Violence  
and Its Links to Incarceration

The Public Health  
Center of the Yale  
Roosevelt Institute



## Foreword

In August 2019, the Public Health Center of the Yale Roosevelt Institute contacted JPI about collaborating during the 2019 – 2020 academic year. Yale Roosevelt is a premier student-run policy think tank that partners with national policy organizations to conduct research that addresses strategic areas of focus. Yale Roosevelt is one of 120 chapters of the Roosevelt Institute nationally, which span across 38 states.

Over the course of the academic year, students from Yale Roosevelt researched the health costs of gun violence and the corresponding impact on mass incarceration. This document reflects the analyses and recommendations developed by the authors. JPI deeply appreciates the work of Yale Roosevelt in publishing this paper, which is a valuable contribution to the conversation on the public health crisis of gun violence and its links to mass incarceration.

As you will read in *A Public Health Crisis: The health cost of gun violence and its link to incarceration*, the accessibility and utilization of firearms impact communities across the country, especially communities of color. Moving forward, JPI intends to build on the foundation developed by Yale Roosevelt in this document to push criminal justice institutions to respond differently to community violence by adopting public health approaches and decreasing this nation's reliance on incarceration.

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# INTRODUCTION

The public health cost of gun violence is enormous – in 2018, the United States had 100,000 incidents of gun violence, 39,740 of which resulted in deaths.<sup>1</sup> Firearms are the second leading cause of death among U.S. children and adolescents, after car crashes.<sup>2</sup> While firearm-assisted suicides comprise a large percentage of these incidents, interpersonal gun violence remains a critical and uniquely American public health challenge. Moreover, those exposed to gun violence even indirectly have been demonstrated to express long-term and even inter-generational trauma. One possible long-term consequence of gun violence is prolonged incarceration. Despite scant evidence of any effect on crime rates, often a firearm’s role in the commission of an offense subjects an individual to an additional sentencing enhancement. Gun violence therefore exacerbates mass incarceration, which has its own public health ramifications. Accordingly, it has become increasingly popular to treat gun violence as a public health crisis, despite obstacles in federal funding for gun violence research.

## COUNTRY COMPARISON

Our report considers the public health impact of gun violence in the United States. Nevertheless, it is important to contextualize these findings within the broader scope of the globe. Comparing the United States to other countries, particularly those of comparable income levels, highlights the extent and singularity of American firearm morbidity and mortality.

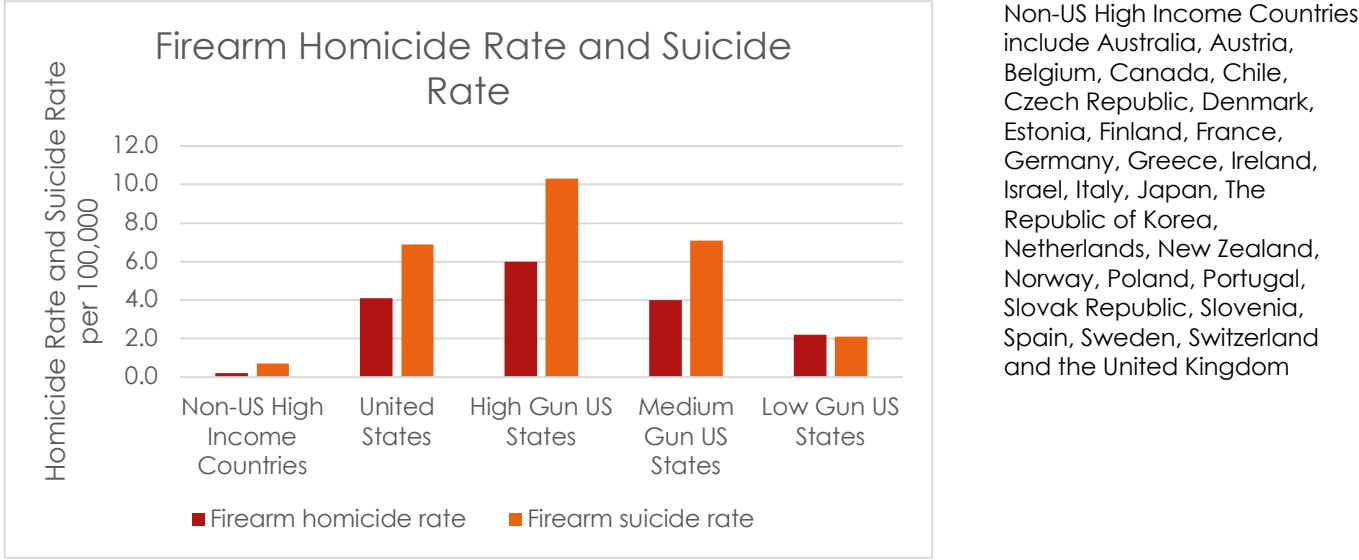


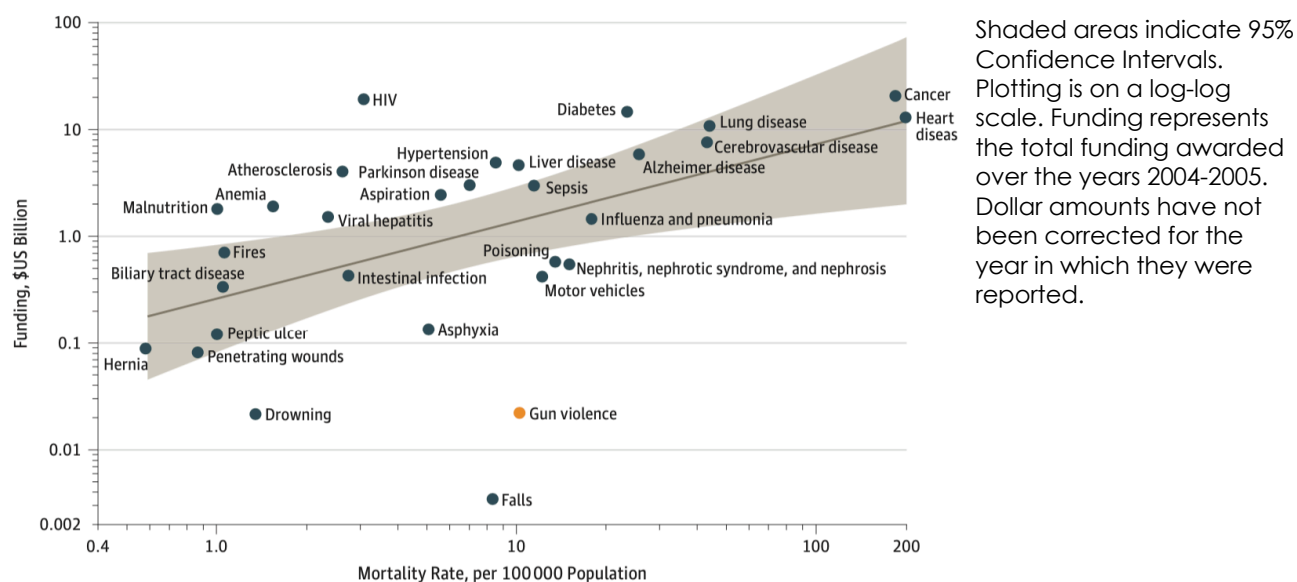
Figure 1. Firearm Homicide Rate and Suicide Rate. Data from Grinshteyn et al. (2019).<sup>3</sup>

The United States has the 28th highest rate of deaths from gun violence in the world: 4.43 deaths per 100,000 people.<sup>4</sup> This rate is especially troubling because it is disproportionately high compared to countries with comparable levels of wealth. Generally, a country’s rate of gun violence inversely correlates to its socioeconomic status.<sup>5</sup> However, data from the World Health Organization (WHO) and the CDC in 2015 demonstrate that, when

compared to other high-income countries, the United States has a 11.4 times higher firearm death rate and a 24.9 times higher firearm homicide rate.<sup>3</sup> Even when disaggregating by gun ownership density, firearm homicide rates were 13.5 times higher in low-gun US states and 36 times higher in high-gun states than in other high-income countries (**Figure 1**).<sup>3</sup> Moreover, among high-income countries, 83.7% of all firearm deaths, 91.6% of women killed by guns and 96.7% of all children aged 0-4 years killed by guns were from the United States.<sup>3</sup>

The United States' gun death rate is high even compared to regions with some of the highest rates of poverty and conflict. For example, the U.S. gun violence death rate is higher than nearly all sub-Saharan African countries, as well as conflict-ridden countries in the Middle East, including Afghanistan, Iraq, Lebanon, Jordan and Syria.<sup>5</sup> Considering these statistics, it is undeniable that gun violence has all encompassing, drastic and specific consequences in the United States.

## THE UNDERFUNDING OF GUN VIOLENCE RESEARCH



**Figure 2.** Mortality Rate vs. Funding for 30 Leading Causes of Death in the United States. Figure from Stark and Shah (2017).<sup>6</sup>

Since 1996, Congress has deterred federal funding for gun violence research with the Dickey Amendment in annual appropriations legislation. Led by Representative Jay Dickey of Arkansas in response to lobbying by the National Rifle Association (NRA), the provision declares that “[n]one of the funds made available in this title may be used, in whole or in part, to advocate or promote gun control.”<sup>7</sup> The Dickey Amendment has been applied to the Center for Disease Control and Prevention (CDC), as well as the Department of Health and Human Services (HHS) and National Institutes of Health (NIH), all of which interpreted the amendment to essentially eliminate funding for gun violence research.<sup>8</sup> Indeed, one study published by the *Journal of the American Medical Association (JAMA)* demonstrates that in the years 2004-2015, compared with other leading causes of death, gun violence is associated with far less funding and fewer publications than predicted based on mortality rate (**Figure 2**).<sup>6</sup> Specifically, gun violence had 1.6% of the funding predicted (\$1.4 billion predicted, \$22 million

observed) and had 4.5% of the volume of publications predicted (38,897 predicted, 1738 observed) from regression analysis.<sup>6</sup>

Recently, however, a relentless series of tragic, high profile mass shootings, particularly those involving schools, has contributed to a greater sense of urgency in public sentiment. With increased public interest and widespread student protests, Congress reached a compromise in passing an omnibus spending bill in March 2018. Although the Dickey Amendment remains in the legislation, a report accompanying the spendings bill clarifies that the amendment does not prohibit federal funding of research on the causes of gun violence.<sup>8</sup> Nevertheless, the bill still does not indicate when research constitutes promotion and advocacy of gun control. Accordingly, the effect of this compromise remains to be seen.

## **OUR REPORT**

A note on terminology – “gun” and “firearm” are not necessarily interchangeable terms. A gun is any ranged weapon that can discharge a projectile, while a firearm is a type of gun that uses an explosive charge to fire. Important devices that are guns and not firearms include air guns such as some long guns and air pistols, which use mechanical gas compression mechanisms and typically fire pellets or BBs. Nonpowder guns can lead to many injuries, particularly among young children; in 2000, there were an estimated 21,840 injuries related to nonpowder guns nationally.<sup>9</sup> However, only 4% resulted in hospitalization, and in 1990-2000, the US Consumer Product Safety Commission reported 39 nonpowder gun-related deaths.<sup>9</sup>

Although “gun” and “firearm” are not synonymous, they are often used interchangeably. Moreover, many different laws governing the use of firearms, such as 18 U.S.C. 921, use a broad definition of “firearm” that includes most guns.<sup>10</sup> The weapons we discuss are almost exclusively firearms. Nevertheless, in reviewing the literature and firearms legislation, we will use the term from the original source. In our original contributions, we will use whatever term is appropriate given their formal definitions.

Here, we attempt to contribute to the conversation on the public health crisis of gun violence and its links to mass incarceration. In this report, we use evidence to identify risk factors and inform policies that protect victims and preempt victimhood.

# EXECUTIVE SUMMARY

In 2018, the United States had 100,000 incidents of gun violence, 39,740 of which resulted in deaths. Those exposed to gun violence – directly or indirectly – often exhibit post-traumatic stress symptoms, including acute stress disorder, depression and anxiety.

Exposure to gun violence has other long-term effects, including a higher risk of perpetrating future violence and initiating gun-carrying. Firearm sentencing enhancements under 18 U.S.C. 924 can also result in extremely long sentences, despite a lack of consensus on whether they change gun violence rates. This is concerning because incarceration has many associated health risks, including limited access to medical care, heightened stress, exposure to infectious disease and post-release isolation and substance abuse. Gun violence also incurs educational losses, as well as the high monetary costs of treatment, business and real estate.

61% of firearm deaths are suicides, 35% are homicides and the rest are accidental or undetermined. Firearm death rates are highest among males and those age 15-35, and Black Americans have three times lower suicide rates but ten times higher homicide rates than Non-Hispanic White Americans. Higher rates of gun violence are associated with weaker gun laws and higher gun ownership rates, and most guns used in violent crimes are acquired through family or peer networks. Gun homicide is also associated with income inequality and social mobility, feelings of insecurity and lack of trust in law enforcement.

Through a review of the literature as well as original research contributions, we recommend the following policies to reduce the health cost of gun violence.

1. Community programs using “focused deterrence” strategies utilizing mediators and outreach workers to establish relationships with high-risk individuals, discourage violent behavior and offer resources to youth, as well as engaging hospitals and clinics as sites of support and “gatekeeping.” Models include Chicago’s Cure Violence program.
2. Engagement with law enforcement to improve police community relations and train officers in harm reduction strategies. Sustained collaborations between the criminal justice, law enforcement and public health sectors should be maintained.
3. Common-sense gun legislation including strict and universal background checks, CAP laws, permits, the rollback of Stand Your Ground laws and the limitation of the sale of assault-type weapons and possibly high-capacity magazines and junk guns. Policy measures should also include imposing stricter prohibitions on straw purchasing and gun trafficking, as well as limiting gun industry legal immunity and lobbying power.
4. Therapeutic measures including both physical and mental health resources to ensure care and support of victims is standardized and accessible for everyone affected, especially under-insured and marginalized communities. Expansion of insurance coverage of those in and leaving the carceral system, as well as the amelioration of conditions (ex. overcrowding) for those incarcerated is also critical.
5. Partner strategies in efforts to increase public education and awareness of gun violence issues, as well as to limit the presence of organized crime and substance abuse. All implemented programs require constant monitoring, evaluation, reassessment and social science research on the dynamics of the particular community in question.

# THE STATE OF GUN VIOLENCE

## PHYSICAL CONSEQUENCES

### Short-Term

Occurrences of gun violence have become increasingly prevalent in the United States and have severe physical consequences. According to recent aggregate data studies analyzed by the Giffords Law Center, approximately 100,000 Americans are shot and injured each year.<sup>4</sup> Of those individuals, approximately 36,000 are killed each year, and in 2018, the CDC reported 39,740 firearm deaths.<sup>1, 4</sup> In 2015, there were an average 98 deaths per day.<sup>3</sup> Overall, firearm deaths count as 7.1% of lives lost before the age of sixty-five, and firearms are the second leading cause of death among youth and adolescents ten to twenty-four years of age.<sup>3</sup> Moreover, gun violence often has lasting consequences even for survivors.

### Long-Term

There is evidence linking gun violence exposure among children with future injury and barriers to development. Compared to non-violent injuries, violent injuries in general are associated with long-term physical disabilities and higher rates of recurrent injury<sup>11</sup>. Several longitudinal hospital-based studies have demonstrated that children and adolescents with an index firearm related injury were significantly more likely to experience a subsequent injury than those presenting to the hospital for other reasons, including other types of violent injury.<sup>11</sup>

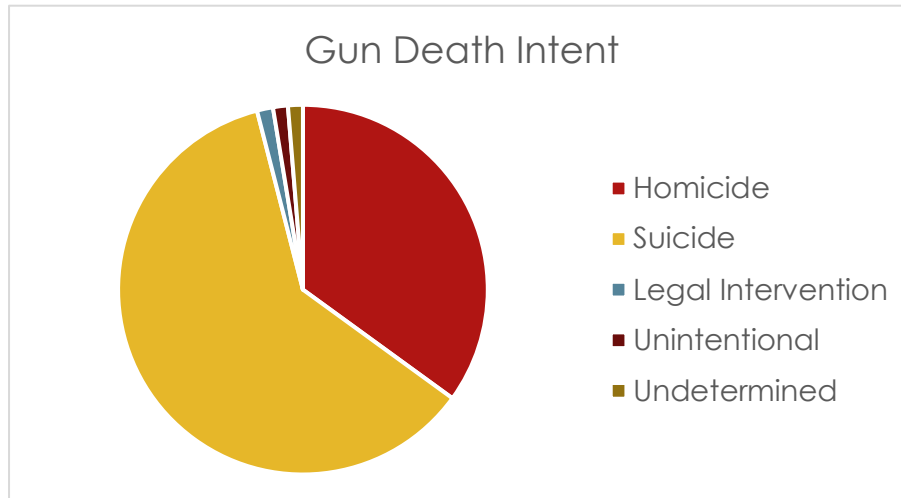
Primary exposure can also impact child development. Pregnant women exposed to the stress and fear accompanying gun violence incidents are more likely to deliver babies with lower birth weights, carrying health complications for generations.<sup>12</sup> Moreover, children exposed to chronic trauma can experience inhibited brain development. Finally, a 2002 study concluded that children who had primary exposure to gun violence faced increased risk of subsequent morbidity and mortality from risk-taking behaviors at an earlier age.<sup>13</sup>

## NATURE OF INJURY

Homicide is not the only source of gun violence. Deaths from gun violence can be disaggregated into homicides (35%), suicides (61%), legal intervention (such as by law enforcement serving on active duty, 1.4%), unintentional shootings (1.3%) and incidents where intent cannot be determined (1.3%) (**Figure 3**).<sup>4</sup>

The United States has an incredibly high rate of firearm-assisted suicides. This category comprises the third leading cause of injury and death for persons aged 35+, after drug overdoses and motor vehicle crashes. The national suicide rate is 13.8 deaths per 100,000 people, with 50% of those fatalities committed by a gun. Although suicide rates are similar across high-income nations, the U.S. has a 9.8 times higher suicide rate than its peer group of thirty-one other countries when firearms are used.<sup>3</sup> Moreover, suicide attempts involving firearms are dangerously effective. Whereas only 20% of people injured in firearm-related assaults die, approximately 85% of individuals who attempt suicide using firearms succeed.





**Figure 3.** Gun Death Intent. Data from Giffords Law Center.<sup>4</sup>

While this report focuses on firearm homicides, it is important to note that these incidents are far outstripped by firearm-assisted suicides. Between 2010 and 2012, the annual rate of firearm suicide was twice as high as the rate of firearm homicide, and it was 38 times the annual rate of unintentional deaths. The national homicide rate is 5.6 deaths per 100,000 people, with half (50%) of those acts involving a firearm. Over the past two decades, while rates of firearm homicide among youth aged 15–24 have declined, the proportion of youth homicides committed with firearms has remained at 80–91%.<sup>14</sup>

## DEMOGRAPHICS

The victims of gun violence in America are disproportionately young males who belong to racial/ethnic minority groups.<sup>19</sup> Men are the strong majority of firearm homicide victims, with 86% of all victims being male.<sup>19</sup> Across age groups, Black Americans are 10 times more likely to be murdered by a firearm than their White counterparts and are five times more likely to be shot and killed by police despite being unarmed.<sup>4</sup> For Black men aged 20-29, the firearm homicide rate is five times higher than that for Hispanic males of the same age group, and at least 20 times higher than that of White males. In 2012, firearm homicide was the leading cause of death for Black men aged 15-34.<sup>15</sup> While women overall had much lower rates of firearm homicide, the same racial and ethnic trends applied.<sup>20</sup>

When decomposed by age, the firearm death rates from all causes from the years 2010-2012 were as follows: 1.2% among ages 0-14, 19.4% among ages 15-24, 19.4% among ages 25-34, 14.9% among ages 35-44, 16.7% among ages 45-54, 13.0% among ages 55-64, and 15.3% among age 65+.<sup>19</sup> Although they comprise the smallest percentage of overall deaths, 1,500 children die as a result of gun violence each year, making it the second leading cause of death for children overall, and the first leading cause of death for African-American children.<sup>4</sup>

There are marked trends related to age and race when comparing homicide and suicide. Rates of firearm suicide were found to increase with age, while rates of firearm homicide were highest (15.1 per 100,000) among those 25-34 years old. Black Americans were found to have the highest rates of overall firearm mortality at 18.1 per 100,000.<sup>19</sup> However, White Americans have the highest firearm suicide rates at 9.2 per 100,000, while Blacks were most likely to be victims of firearm homicide, at a rate of 14.8 per 100,000.<sup>19</sup>

There is also significant variance in firearm morbidity and mortality rates both regionally and between states. Generally, the states with the lowest rates of both firearm homicide and suicide were in New England, while those with the highest were in the Southeast. States with high rates of firearm suicide but low rates of firearm homicide tended to be in the rural Northwest.<sup>20</sup> By region, firearm deaths from 2010-2012 were distributed as follows: Northeast: 11.3%, South: 45.5%, Midwest: 20.8%, West: 22.4%.<sup>19</sup>

## **MENTAL HEALTH CONSEQUENCES**

Scientific research on mental health is severely lacking, and when compounded with the suppression of gun violence research, it can be extremely difficult to determine the mental health impact of gun violence. Nevertheless, existing evidence suggests that gun violence has an enormous and lasting effect – for those directly and indirectly involved.

### Direct Exposure

Compared to non-violent injuries, violent injuries in general are associated with higher rates of post-injury mental health symptoms.<sup>11</sup> For firearm injury in particular, multiple studies have reported high levels of post-traumatic stress symptoms, including acute stress disorder, depression and anxiety following the injury.<sup>11</sup> Moreover, children who survived incidents of gun violence demonstrated a higher likelihood of suffering from developmental delays.<sup>13</sup>

### Indirect Exposure

Research has indicated a strong link between gun violence and adverse mental health outcomes, even for those exposed only indirectly. One study classified the city of Baltimore into “hot” and “cold” spots based on the number of violent episodes per year and asked residents about their mental health symptoms. They found that in hot spots, the mean score was 61% higher for depression and 85% higher for PTSD. An estimated 14.8% of residents of violent crime hot spots met thresholds for moderate depression or a diagnosis of PTSD, compared to only 6.5% of residents at the cold spots.<sup>16</sup>

Several studies have focused specifically on adolescents to understand how gun violence exposure impacts their mental health. One study on high school students in New York City found that students who knew someone who was murdered were almost twice as likely to report suicidal ideation and four times as likely to report a suicide attempt. A similar study among rural youth exposed to gun violence found that those exposed to gun violence reported significantly higher levels of anger, dissociation, posttraumatic stress and total trauma ( $p < 0.001$ ).<sup>17</sup> Moreover, 91% of those exposed to gun violence reported committing an aggressive act within the past year, compared to 75% of those not exposed to gun violence.<sup>15</sup> The adverse mental health consequences of gun violence persist regardless of environment.

### Mass Shootings

Many have suffered the consequences of mass shootings in recent years. Survivors of these tragic events have exhibited persistent negative mental health outcomes.

Exposure to mass shootings has severe lasting mental health consequences. Lowe and Galea's robust literature review demonstrates that mass shooting events can have at marked mental health consequences for victims and members of affected communities, including increases in Post-Traumatic Stress Syndrome (PTSS), depression, survivor's guilt and other psychological symptoms.<sup>18</sup> For instance, one study included in the review demonstrated that in the aftermath of a mass shooting in Brooklyn, levels of PTSS depression, and anxiety were markedly higher in youth who directly experienced the attack than an age-matched comparison group of youth in the same community who were not directly exposed.<sup>16</sup> Another study found that although 46.1% of tested individuals demonstrated resilience following exposure to mass gun violence, 42.1% demonstrated symptoms of PTSS, and 11.9% demonstrated an aggravated version in the form of post-traumatic stress disorder (PSTD).<sup>19</sup> In general, individuals exhibiting PTSD range from 10% to 36% following mass shootings.<sup>17</sup> Even for those not directly involved, mass shootings can undermine beliefs about the world being just and safe. Challenges to that expectation may spark post-traumatic stress, depression, anxiety, and substance abuse, especially for survivors who believe their lives or loved ones' lives are constantly in danger.<sup>20</sup>

The review also found that these adverse mental health consequences are not evenly distributed. Indices of greater incident exposure, including proximity to the attack, acquaintance with the deceased and higher sensory exposure are consistently associated with more severe psychological outcomes.<sup>16</sup> Moreover, a number of studies have noted that ethnic minorities, females and individuals of lower socioeconomic status display higher rates of long-lasting PTSD following a mass shooting. Similarly, indicators of fewer social resources – such as lower social solidarity or perceived social support – have been consistently associated with adverse post-incident outcomes.<sup>16</sup>

Time progression is also an important factor in assessing the psychosocial consequences of a traumatic event, as the majority of individuals who exhibit certain stress symptoms recover fully within 6-16 months post trauma.<sup>17</sup> For survivors, the American Psychological Association identifies three stages of healing in the aftermath of a shooting are generally recognized. The acute phase immediately after the event is characterized by denial, shock and disbelief. The intermediate phase several days to weeks afterward is characterized by fear, anger, anxiety, difficulty paying attention, depression and disturbed sleep. Lastly, in the long-term phase, several months after the event, victims demonstrate periods of adjustment and relapse, but no longer need continuous mental health support.<sup>18</sup>

## **OTHER LONG-TERM CONSEQUENCES**

### **Substance Abuse**

Gun violence exposure has also been associated with greater drug use. One study reported that direct and indirect exposures to gun violence were significantly correlated with drug use in both adolescence and adulthood.<sup>21</sup> Among adolescents and adults, witnessing violence, being threatened with violence, and experiencing violence were all significant predictors of drug use and substance abuse. Moreover, these adolescent patterns tended to persist through adulthood, suggesting long-term behavioral changes.

## Delinquency and Firearm Carriage

Exposure to gun violence is associated with a higher propensity to perpetrate violence in the future and to initiate gun-carrying.

Community and family violence exposure in general is associated with delinquency. One study found that students who had been exposed to gun violence, including hearing gun shots and watching a shooting, had higher rates of delinquent behavior ( $r=0.32$ ;  $p=0.02$ ).<sup>22</sup> Similarly, a longitudinal study on 1,500 12-15-year-olds in Chicago demonstrated that one year later, the youth exposed to gun violence were more aggressive and committing more violent offenses than those who were not exposed.<sup>23</sup> Teenagers who have witnessed gun violence are also more likely to engage in delinquency as forms of protection.<sup>24</sup> For example, many teens reported joining gangs and arming themselves with weapons following a gun shooting. Researchers have suggested that gun violence may threaten teenagers' sense of safety, and they respond with self-protective behaviors often construed as delinquency or criminality.

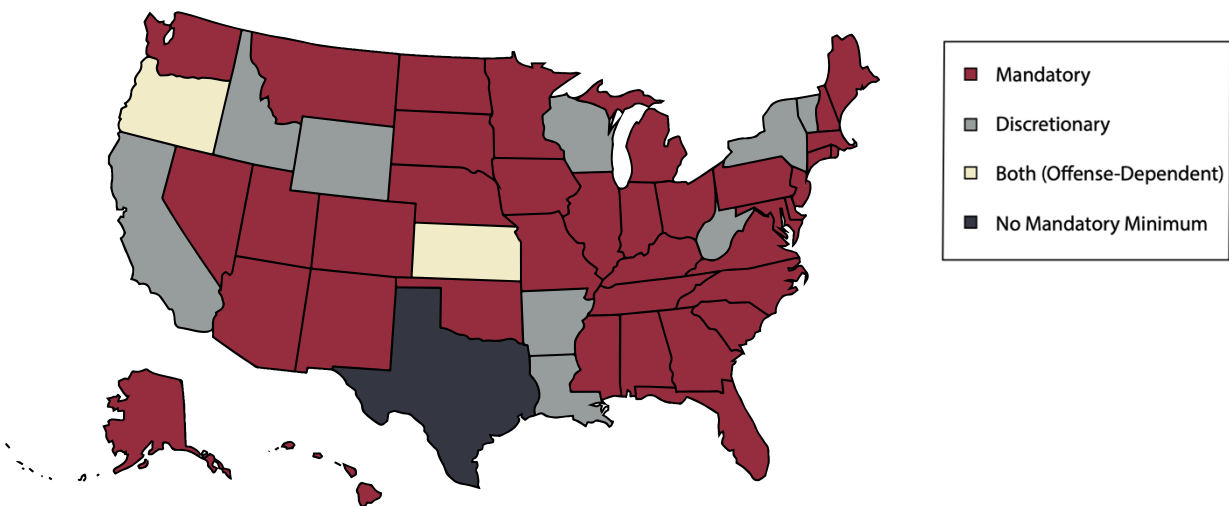
Gun violence exposure is also linked to a greater likelihood to initiate gun-carrying. One study found that youth who are victims of violence (including gun violence) are 132% more likely to initiate gun carrying.<sup>25</sup> A similar study found a causal link between future gun carrying and adolescent exposure to gun violence specifically, in which an adolescent male exposed to gun violence had a 43% higher likelihood of carrying a gun than those who were not exposed.<sup>26</sup> One study among African American youth similarly found that direct, peer and indirect victimization all significantly predicted the degree of gun related delinquency ( $p<0.01$ ).<sup>27</sup>

These links between victimhood, delinquency and gun carrying are consistent with another trend in gun violence: a cycle of victimization and perpetuation. We will detail this further in the section on **Risk Factors**, but now we turn to a final long-term consequence of gun violence – mass incarceration.

# MASS INCARCERATION

One major long-term consequence of gun violence is perpetrators' time spent in the penal system. In this section, we examine the nature and efficacy of firearm sentencing laws, as well as the public health outcomes of the criminal justice system itself.

## MANDATORY MINIMUMS AND FIREARMS SENTENCING



**Figure 4.** Mandatory versus discretionary minimum firearm sentencing enhancements by state. Data from Restore Justice Illinois (2018)<sup>28</sup>

Sentence stacking, or legal code 18 U.S.C. 924, allows for the charging of multiple sentences in connection with either possession, usage, or intent to use a firearm or drugs, particularly for certain classes of offenders.<sup>29</sup> Each enhancement can add 5-25 years to a base sentence and must be served consecutively. Each state carries their own sentence enhancements, with varying lengths and degrees of discretion (**Figure 4**).<sup>28</sup>

Federal firearm offenders are almost exclusively convicted by two subsections of 18 U.S.C 924: 924(c) and 924(e), which both carry mandatory minimums. 18 U.S.C 924(c) “prohibits using or carrying a firearm during and in relation to, or possessing a firearm in furtherance of a crime of violence or drug trafficking crime” and prescribes a minimum penalty of at least five years of imprisonment.<sup>30</sup> These five years can increase depending on what type of firearm was involved and how it was used. Section 924(c) requires these mandatory minimums to be run in addition and consecutively to any other term of sentence imposed on the person, including any those imposed for the underlying violence or drug trafficking crime.<sup>30</sup> Additionally, Section 924(c) establishes a longer mandatory minimum of 25 years for each secondary and subsequent offense if the offender is convicted of multiple counts under Section 924(c), even if all offenses were charged in a single indictment.

Section 924(e), also known as the Armed Career Criminal Act (ACCA) acts solely as sentencing enhancement for offenses under Section 922(g), which makes it unlawful for certain prohibited persons, including convicted felons, fugitives from justice, those dishonorably discharged from the armed forces and those illegally or unlawfully in the United States, to

“possess a firearm or ammunition that is in or affecting commerce; to ship or transport a firearm or ammunition in interstate or foreign commerce; or to receive any firearm or ammunition which has been shipped or transported in interstate or foreign commerce.”<sup>30</sup> The ACCA mandates a 15-year sentencing minimum for recidivists convicted of unlawful possession of a firearm under 18 U.S.C. 922(g), who have three prior state or federal convictions for violent felonies or serious drug offenses.<sup>31</sup>

A report by the United States Sentencing Commission finds among its key findings that these firearm mandatory minimums result in very long sentences; in the 2016 fiscal year, the average offender convicted under section 924(c) received a sentence over 12 years, and offenders convicted under the ACCA received an average sentence of over 15 years. These sentences are even longer for offenders charged with multiple counts under section 924(c), for whom the average sentence exceeded 27 years. Under these laws, even first-time felony offenders found in possession of a firearm — despite not using, inflicting harm, or threatening another person — can ultimately serve sentences for decades.<sup>32</sup>

## SENTENCE STACKING EFFICACY

The logic behind firearm sentencing enhancements is that weapons-related offenders are considered more likely to recidivate than other offenders. This logic is under extensive debate. A study by the Illinois Criminal Justice Information Authority using data from 2003 showed that there were high rates of rearrest, reconviction, and reincarceration among individuals arrested for firearm-related reasons versus their non-firearm matched peers.<sup>33</sup> Another report by the United States Sentencing Commission on 25,000 federal offenders concluded that 68.1% of firearms offenders were arrested again in the next 8 years, compared to only 46.3% of non-firearm offenders.<sup>34</sup> The biggest piece of support for this practice came from a 2011 study from the University of Pennsylvania, which found that sentencing enhancements led to a 5% decrease in gun robberies over 3 years.<sup>35</sup>

However, others have questioned the results of studies such as these. The 2011 Pennsylvania study has been widely refuted, and the vast majority of literature suggests that firearm sentencing enhancements do not significantly lower recidivism rates.<sup>28</sup> A study by the National Research Council in 1978 and repeated in 1993 showed that increasing the severity of the punishment was likely not making a measurable difference in recidivism.<sup>36</sup> Many states have also conducted their own studies on a local level. A study in Florida found that a sentencing enhancement law led to no reduction in recidivism rate, while similar studies in Michigan found that sentencing enhancements did not lead to reductions in firearm-related homicides, assaults, or robberies.<sup>36</sup> While some studies did find lower rates of firearm-related crimes after the introduction of these policies, they were nearly always found to be caused by an external factor such as exogenous fluctuations in homicide rates.<sup>36</sup>

If these studies are sound, then the sentencing enhancements attached to gun laws do not change rates of gun violence and instead only add years onto offenders' sentences. Sentencing enhancements also ignore more effective ways to limit recidivism; for instance, one study from 2007 found that a stronger determinant for recidivism was the community these individuals were returning to, or their history before committing a weapons-related offense.<sup>37</sup> Moreover, the ineffectual addition of years onto prison sentences exposes individuals to the harmful effects of the penal system for longer. This may introduce a larger health burden than that supposedly alleviated by sentencing enhancements.

## SENTENCE STACKING AND MASS INCARCERATION

In 35/44 states with complete reporting, **1 in 10** serving sentences had been there for **≥10 years**



In recent years, the rate of incarceration in the United States prison system has seen a slight decline of 7% since its peak in 2009. However, the national prison population ballooned by approximately 700% between 1972 and 2009.<sup>38</sup> The rapid growth of the US prison system has been driven by federal policies attempting to reduce national crime rates. Beginning in the late 1960s with the increased policing of domestic terror and through the 1990s with the implementation of a “three strikes you’re out” policy, the rate of incarceration in the US saw a nearly 5-fold increase from 1973 to 2007.<sup>39, 40</sup> At its peak, the US prison system accounted for approximately 25% of the global prison population despite the US population only accounting for less than 5% of the global population.<sup>39</sup> A 2019 study on the state of “decarceration” in the US found that it would take 72 years for the prison population to be halved.<sup>38</sup>

With more individuals convicted with long sentences, the population of the prison system continues to increase regardless of the slight decline in overall incarceration rates. A study of data compiled by the National Corrections Program since 2000 found that in all 44 states with complete reporting, the average length of prison sentences served has increased.<sup>41</sup> In 35 states, 1 in 10 people actively serving sentences have been there for at least a decade.<sup>41</sup> When individuals are convicted with possession of a firearm and prosecutors apply 18 U.S.C. 924(c), they undoubtedly will serve many years in the prison system with limited ability to appeal excessively long sentences. Accordingly, mandatory minimums are a form of “sentence stacking” that contributes to the already enormous prison population in the United States.<sup>38</sup>

## HEALTH COSTS OF INCARCERATION

### Medical Care

The 1976 Supreme Court case *Estelle v. Gamble* ruled that all prisoners are entitled to adequate healthcare while serving a term in prison or jail, but not while on probation, parole, home confinement, or pending disposition of charges.<sup>42</sup> Incarcerated individuals have access to basic health coverage, including mental health resources, and may also buy supplemental, specialized services. Ironically, this makes them the only population in the United States guaranteed health care. This is significant because many entering the carceral system were previously uninsured. However, policy loopholes result in many incarcerated Americans facing limited access to medical examinations and prescriptions and a broader lack of autonomy over their own healthcare. Incarcerated individuals can neither receive professional employee benefits nor be eligible for Medicaid, as Medicaid law prohibits the payment of federal Medicaid matching funds for services provided to an inmate of a public non-medical institution.<sup>43</sup>

Thirty-five states have inmate medical copayments to raise prison revenue and deter prisoners from abusing medical services. This money largely comes from prison job wages and other family contributions, but it poses a financial strain on inmates who earn as little as \$0.12/hour. Even personal care items such as deodorant, toothpaste and sanitary pads can be worth multiple days of pay at \$1.93, \$1.50 and \$2.63/pack, respectively. In comparison, copays are often \$20-100. Nevertheless, health care remains second highest expense all prisons bear after staff salaries. Accordingly, as of 2012, twenty states switched to cheaper prison private health care coverage and often choose to deny people over the age of sixty-five or those who suffer from chronic illnesses. Some prisons also have a history of denying patients hospital stays and punishing them for repeated requests.<sup>44</sup>

Chronic diseases such as Tuberculosis, HIV, Hepatitis B & C, arthritis, diabetes, and STDs are markedly more prevalent in incarcerated populations.<sup>43</sup> However, a nationwide survey found that among all inmates with a persistent medical problem, 13.9% of federal inmates, 20.1% of state inmates, and 68.4% of local jail inmates had not received a medical examination since incarceration.<sup>45</sup> Moreover, among local jail inmates who had entered prison with an active medical problem calling for laboratory monitoring, most had not undergone a blood test since incarceration. Lastly, following serious injury, 650 federal inmates (7.7%), 12,997 state inmates (12.0%), and 3183 local jail inmates (24.7%) were not seen by medical personnel.<sup>45</sup>

## Mental Health

Information on the mental health status of inmates is severely lacking. Nevertheless, we have attempted to describe the mental health burden of incarceration among individuals during incarceration and after release.

A survey of over 5,000 American former inmates found that incarceration is related to subsequent mood disorders, including major depressive disorder, bipolar disorder, dysthymia, anxiety disorders and phobias.<sup>46</sup> However, it is difficult to determine whether these conditions existed prior to incarceration, given that analysis of nationwide survey data from the U.S. reveals that a high proportion of inmates had at least one previously-diagnosed mental condition.<sup>45</sup> Nevertheless, among those reporting a mental condition that had been treated with a psychiatric medication in the past, a significant number of federal (30.9%, n=4,228), state (31.4%, n=73,258) and local (54.5 %, n=63,190) inmates had not taken medication for a mental condition since incarceration.<sup>45</sup> A 2014 international systematic review demonstrated that isolation, overcrowding and larger prisons are associated with poorer mental health.<sup>47</sup>

## Altered Mortality Risks in Prison

Incarceration is also associated with changes in mortality risk, but the relationship is slightly more complicated. Most deaths for prison inmates result from preexisting conditions (89%), with a 2007 study citing heart disease as the leading cause.<sup>48</sup> Suicide was the only significant external cause of death and accounted for 6% of inmate deaths.<sup>48</sup> A 2011 study found that among Texas inmates, the top three causes of inmate death were infection, cancer, and cardiovascular disease, with infection death rates 2-3 times higher than their non-incarcerated peers.<sup>49</sup> Of these deaths due to infection, 69% were ultimately attributed to AIDS related causes. A 2010 study by Patterson found that incarceration had a stronger negative effect on mortality for female prisoners.<sup>50</sup>



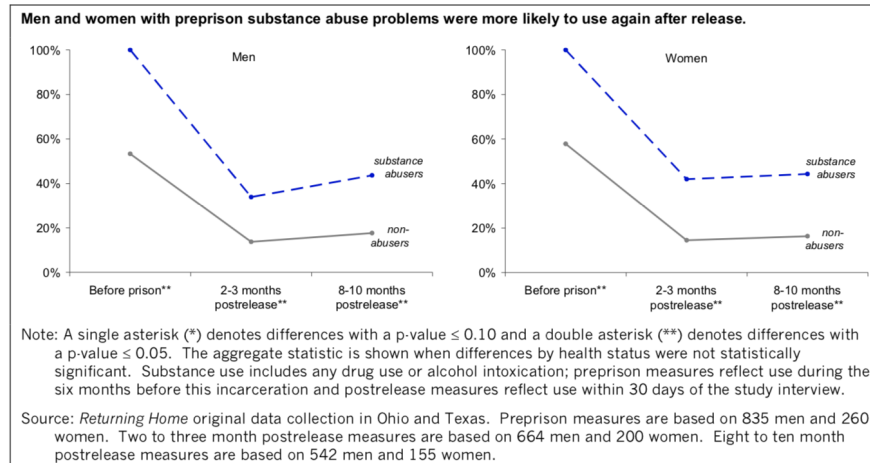
An important distinction must be made in comparing the mortality rates while incarcerated for Black versus White inmates. Rosen et al. used data from 1995-2005 in North Carolina to find that overall, white inmates had a standardized mortality ratio (SMR) of 1.12 compared to non-incarcerated white men, due to HIV, viral hepatitis, liver disease, cancer, and respiratory disease.<sup>51</sup> 15 years after release, a similar study in Georgia found that a SMR for white men was 1.28 mainly due to infectious or cardiovascular disease and cancer.<sup>52</sup> However, similar studies of black inmates identified the opposite trend. National data has demonstrated that incarcerated Black men had a 19% lower mortality risk compared to non-incarcerated Black men, and in North Carolina, one study found an SMR of 0.52 among Black inmates compared to Black state residents.<sup>53</sup> The reasons proposed for this decreased mortality risk is that incarcerated Black men are protected against violence and transport accidents which are a leading cause of mortality for non-incarcerated Black men, and incarceration may allow for better access to healthcare.<sup>51</sup> However, the Spaulding et al. study found that this data might be somewhat skewed due to compassionate release of inmates who are about to die.

## Family Health

The impacts of parental incarceration are deeply influential in family structures. Princeton and Columbia's Fragile Families and Child Wellbeing Study finds that parental incarceration is associated with increased physical aggression among boys.<sup>54</sup> Confusion and neglect during the duration of a parent's incarceration can be traumatic, and the uncertainty around inefficiencies and standards in court processing, arrest, and incarceration can be harmful to all family members. Families of inmates can also spend up to one-third of their income on contact with incarcerated family members through phone call fees, transportation costs, sending letters and more.<sup>55</sup> The financial costs of parental incarceration persist even after the incarcerated family member is released, as a criminal record greatly affects one's future employment prospects.

## Health After Incarceration

Following release from prison, an individual faces a 13 times higher probability of death than their non-incarcerated peer. This spike in mortality is mostly due to the risk of drug overdose following release, and it steadily falls in subsequent weeks.<sup>56</sup> A 2008 study in Ohio and Texas prison/jail systems also found that approximately 52% of men and 41% of women received treatment for substance abuse while incarcerated.<sup>57</sup> 8-10 months after release, however, rates of treatment for substance use fell to one quarter, while rates of substance usage rose (**Figure 5**). These results are representative of a broader lack of access to medical health services for individuals completing incarceration terms. Of departing prisoners, 68% of men and 58% of women were without health insurance for 8 to 10 months after being released, yet in the same time frame, 70% of individuals with physical and mental health conditions utilized emergency or charitable health services.<sup>57</sup> Among inmates taking medication prior to entering jail, 26.3% of federal inmates, 28.9% of state inmates, and 41.8% of local jail inmates stopped following their incarceration.<sup>45</sup>



**Figure 5.** Upon release, those with a history of substance abuse were likely to relapse. Figure from Mallik-Kane and Visher (2008).<sup>57</sup>

Other studies have cited additional causes. A 2013 study found that every year in prison added 16% to an individual's odds of death and a 2 year decline in life expectancy, and that the time it took for these odds to return to normal was approximately two-thirds of the time spent in prison.<sup>58</sup> Proposed reasons for these higher mortality rates include exposure to infectious disease in prison conditions, incarceration as an acute stressor leading to chronic bad health outcomes and incarceration serving as a barrier to later social integration.<sup>51</sup>

Former inmates also struggle with the mental health consequences of returning home after incarceration.<sup>59</sup> Studies have found that the majority of inmates exhibit lower levels of depression and stress upon release, but between baseline and three weeks post-incarceration, 30.8% exhibited greater depression and 29.8% had greater stress levels.<sup>60</sup> In interviews, former inmates frequently recalled nightmares about prison and avoided crowded spaces with stimuli reminding them of incarceration. Many inmates struggle with regaining their personal autonomy after release, and due to a reliance on external structures and monitoring, some may have limited ability to restrain themselves from engaging in potentially self-destructive behavior.<sup>59</sup> Many also face difficulties in interpersonal relationships, exiting prisons with hypervigilance, a lack of trust and a "prison mask" where they are unable to express emotions or vulnerability. Individuals frequently exhibit a diminished sense of self-worth and face social isolation and loneliness, especially long-term inmates who lack a strong support system upon return.<sup>59</sup>

Having reviewed the link between gun violence and incarceration, the efficacy of firearm sentencing and the health costs of incarceration, we return to analysis of gun violence more broadly. Our next section describes the risk factors for gun violence victimization and perpetration.

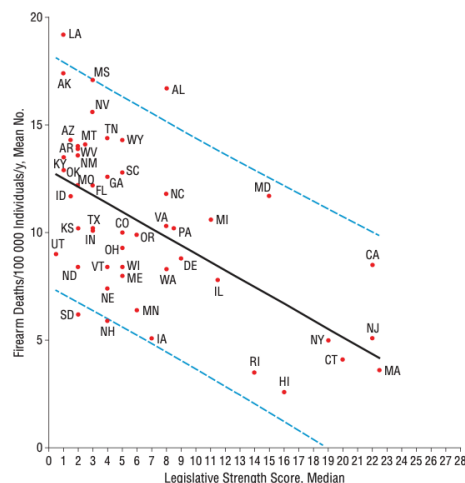
# RISK FACTORS

In this section, we identify who is at highest risk of perpetrating and being victim to gun violence to recommend targeted interventions. It should be noted that with such a complex issue as gun violence, unless otherwise stated, these factors do not necessarily imply causality.

## GUN OWNERSHIP RATES AND LEGISLATION

Gun ownership rates are significantly related to firearm mortality. The literature demonstrates a strong connection ( $p < 0.001$ ) between gun ownership and both firearm suicide and firearm homicide rates.<sup>61</sup> High levels of gun ownership may facilitate higher rates of firearm-related violence in both increased accessibility of guns as well as a cultural environment that makes the enactment of protective firearm laws more difficult.<sup>61</sup>

Relatedly, the strength of state gun laws does impact firearm violence statistics. An article published by *JAMA Internal Medicine* and cited by over 200 authors found that legislative strength was significantly associated with lower rates of firearm fatalities ( $p < 0.001$ , **Figure 6**).<sup>61</sup> Comparing the top and bottom quartiles of legislative strength, the bottom quartile had 6.64 more firearm-related deaths per 100,000 annually.<sup>61</sup> These findings were corroborated by Kalesan et al. (2018), who found that certain legislation packages could reduce national firearm mortality rates by nearly 10 people per 100,000.<sup>62</sup>



**Figure 6.** Legislative strength score vs. overall firearm death rate ( $p < 0.001$ ). Lines represent regression lines with 90% prediction bands. Data taken from Fleegler et al. (2013).<sup>61</sup>

Protective firearms legislation centers on limiting access to firearms, particularly among high-risk individuals, and making available firearms less deadly. Measures include regulations on those purchasing, such as more extensive background checks and stricter licensing requirements. They also include regulations on firearms manufacturers and dealers, such as stricter licensing, record-keeping and safety precautions, as well as ensuring child protection and banning the sale of certain firearms and ammunition. Protective policies also involve the repeal of existing legislation such as Stand Your Ground laws and allowing

concealed carry and guns in public places, as well as laws providing legal immunity to the gun industry. We will review the details and efficacy of these policies in **Recommendations**.

## DEMOGRAPHICS

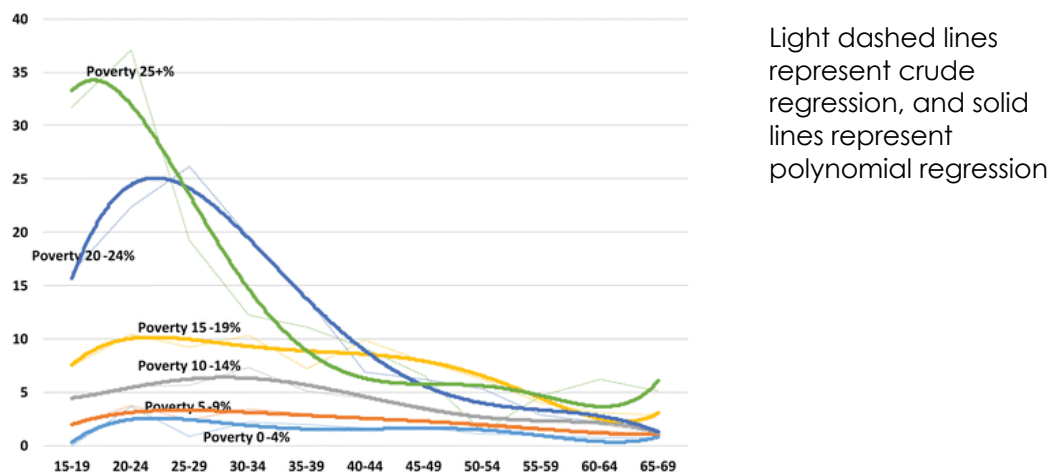
### Geography

A 2017 poll conducted by the Pew Research Center indicates that gun ownership rates in the Northeast (16%) are about half as high as those in the South (36%), Midwest (32%) and West (31%).<sup>63</sup> However, straw purchasing was involved in one-fourth of US Bureau of Alcohol, Tobacco, and Firearms (ATF) trafficking investigations in its Southwest and Western regions but almost two-thirds of those in the Northeast.<sup>64</sup> Regional gun ownership rates mirror regional firearm mortality, with the Northeast, South, Midwest and West comprising 11.3%, 45.5%, 20.8% and 22.4% of firearm deaths, respectively.<sup>19</sup>

Gun violence is not an exclusively rural, suburban or urban problem. Among those who live in rural areas, 46% say they are gun owners, compared with 28% of those who live in the suburbs and 19% in urban areas.<sup>63</sup> Rural gun-owners have a 20% higher likelihood of becoming gun owners before age 18.<sup>65</sup> Gun owners in urban, suburban and rural areas offer similar reasons for owning guns, with About 70% of those who live in urban or suburban areas and 62% of those in rural areas saying protection is a major reason they own a gun. Moreover, similar rates of rural (56%) versus urban (51%) gun owners say that there is a gun that is both loaded and easily accessible to them all or most of the time when they are at home.<sup>65</sup>

Urban and rural communities face similar rates of youth firearm mortality, but its form varies.<sup>66</sup> Youth in urban areas, particularly in impoverished and/or underserved minority communities, are more likely to be homicide victims, whereas their rural counterparts are more often the result of accidental shootings or suicide.<sup>67</sup> While urban 15-19 year-olds present the greatest number of hospitalizations for firearm assaults, there is a higher hospitalization rate for 5-9 year-olds and 10-14 year-olds in rural areas.<sup>68</sup> Unintentional injuries are the leading cause of hospitalizations in younger age groups across geographical categories.

### Age

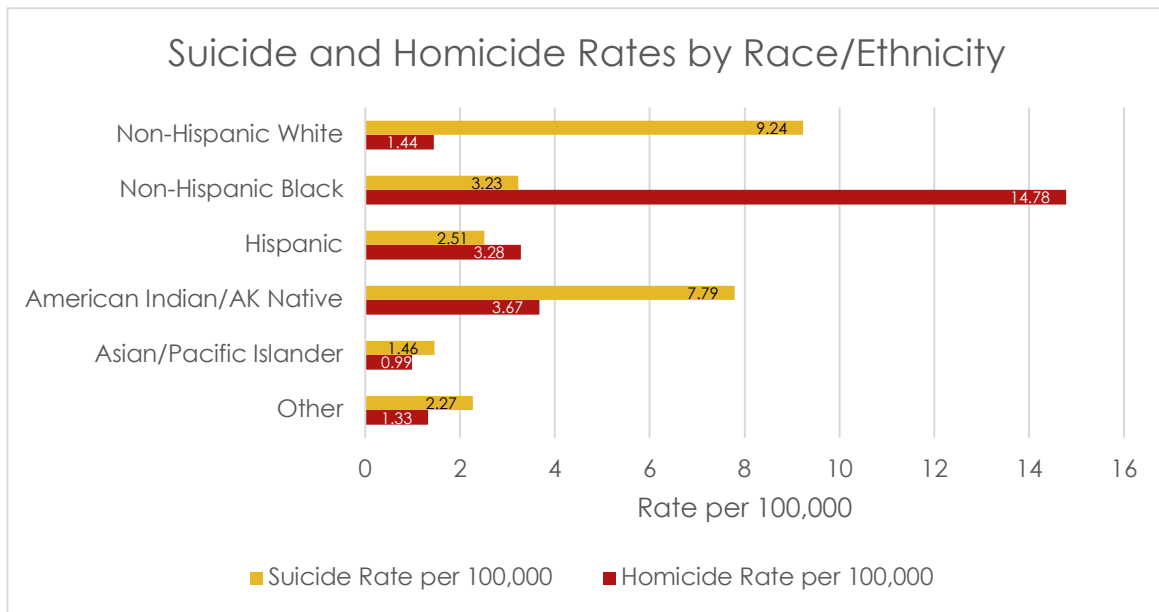


**Figure 7.** Age-homicide rate curve by age group at six standard poverty brackets in California, 1991-2012. Figure taken from Males (2015).<sup>69</sup>

Offending rates are highest among youth and young adults under the age of 21, although youth offending has been declining.<sup>70</sup> In 2014, 47.2% of perpetrators were between ages 12-24, which is only 17.7% of US population.<sup>71</sup> One reason for this trend may be the higher rates of poverty among youths. One study suggests that young people do not “age out” of crime, but rather “wealth out.”<sup>69</sup> The study reported that among 15- to 24-year-olds, 83% of gun homicides occurred among poverty levels above 20%. At poverty levels below 20%, there was a much weaker association of age and gun violence (**Figure 7**). Another may be that youth also have a less developed frontal cortex, which may lead to greater impulsivity, poorer risk evaluation and over-reliance on emotional centers for decisions, increasing the likelihood of committing reckless gun violence.<sup>72</sup> Finally, youth may have better access to guns through peer channels.<sup>73</sup> A study of Chicago high crime neighborhoods reported that 69% of young adult participants said that guns can be acquired within hours. Young people were likely to obtain guns through social networks of street dealers, friends, or family.

## Race

Black males are much more likely to be killed in firearm homicides than their white counterparts. Overall, Black Americans are 14 times more likely to be injured in a gun assault and 10 times more likely to be murdered by a gun, with Black men comprising 52% of homicide victims (**Figure 8**).<sup>4</sup> In terms of police shootings, unarmed Blacks are 5 times more likely to be shot and killed than their white counterparts.<sup>4</sup> Homicide victimization is one of the contributing factors proposed to explain why Black males have a five year shorter life expectancy than white males.<sup>4</sup> However, White men have much higher firearm-assisted suicide rates than any other group, with non-Hispanic White men and women constituting 87.4% of victims.<sup>19</sup>



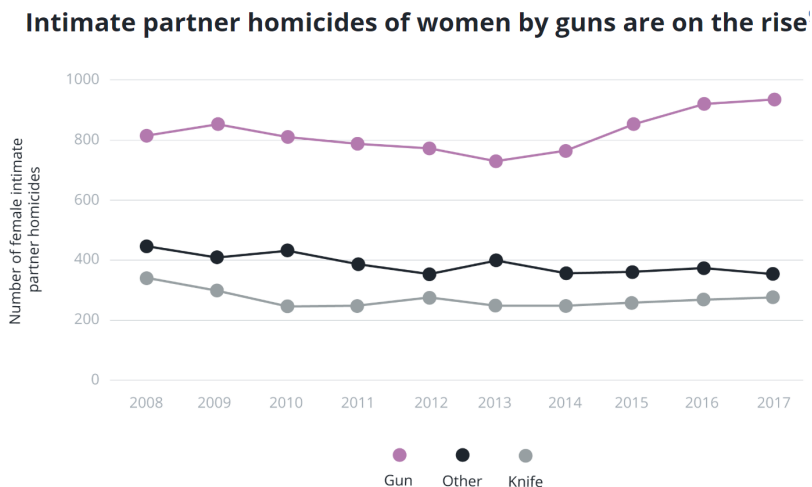
**Figure 8.** Suicide and Homicide Rates per 100,000 by Race/Ethnicity. Data from Fowler et al. (2015)<sup>19</sup>

A study by Lowe and Galea found that youth directly exposed to gun violence had higher levels of PTSD, depression, and anxiety, and that this risk was more pronounced in racial minorities. According to a study by Pastor, Black youths are more likely to witness all types of violence, including gun violence, than their non-Black peers. As shown by a study by Fitzpatrick and Boldizar, when coupled with a lack of a male parental figure, youths, especially females, who experience violence are more likely to experience the effects of PTSD.<sup>74</sup> Armstrong and Carolson explain gun violence as a cultural trauma for Black Americans, as there is trauma in “both aftermath and anticipation.”<sup>75</sup>

## Gender

Most victims of fatal gun violence are male (86%, 18.08 per 100,000).<sup>19</sup> Males dominate firearm suicides (86.9%, 13.09 per 100,000) as well as firearm homicides (84.1%, 6.13 per 100,000).<sup>19</sup> Similarly, men comprise 89.4% (38.37 per 100,000) of all nonfatal firearm injuries. These statistics are not consistent across all populations. For instance, Black non-Hispanic females have a higher homicide rate (3.2 deaths per 100,000) than White non-Hispanic males (2.2 deaths per 100,000).<sup>76</sup> This is consistent with the trend that White individuals have higher rates of firearm-assisted suicide, while Black individuals have higher risk of firearm-assisted homicide.

Women are at a much greater risk of being victims of intimate partner homicides. Approximately 85% of victims of intimate partner homicide (IPH) are women, and IPH accounts for nearly 50% of all homicides involving women in the United States each year.<sup>77</sup> Rates of IPH using guns have been increasing since 2013 compared to other methods (**Figure 9**). Similarly, compared to White women, women of color are twice as likely to be victims of IPH, and Black women age 18-34 are nearly three times more likely to be victims of IPH than age-matched White women.<sup>78</sup>



**Figure 9.** Female intimate partner homicides by weapon, 2008-2017. Figure taken from Everytown for Gun Safety (2019)<sup>78</sup>

Sexual and gender minorities have also emerged as a population at high risk for experiencing gun violence. Although guns are far less prevalent in LGBT households, LGBT individuals are more likely to be victims of gun violence, particularly suicides. LGBT students (23%) attempt suicide more frequently than heterosexual (5.4%) youth, and 34.6% of

transgender youth attempted suicide in 2018.<sup>76</sup> Similarly, according to the Federal Bureau of Investigation's Uniform Crime Reports (UCR), 18.4% of hate crimes are based on sexual orientation or gender identity bias.<sup>76</sup> An estimated 16.5% of anti-LGBT hate crimes were "aggravated assaults," indicating the presence of a weapon. However, researchers suggest that these statistics are underestimates, because the UCR only includes hate crimes reported to and confirmed by the police. Additionally, there is no robust data collection on LGBT youth because sexual orientation is usually not designated on death certificates.

## Socioeconomic Class

A 2019 study published by *PloS Medicine* demonstrated that county levels of social mobility and income inequality also were statistically significant ( $p < 0.05$ ) in predicting gun homicide rates.<sup>79</sup> A single standard deviation increase in the county Gini coefficient (a measure of inequality) was associated with a 10% higher total number of firearm-related homicide incidents and non-mass shooting homicide incidents.<sup>79</sup> A similar increase in social mobility was associated with a 25% reduction in the homicide rate and a 24% reduction in the number of non-mass shootings.<sup>79</sup> Further research remains to determine whether these relationships are causal.

A 2017 study in Philadelphia also demonstrated that residence blocks' median household income itself was negatively correlated with firearm assaults, (event location median income = \$25,125, interquartile range = \$18,074–\$433,500).<sup>80</sup> However, these results were stratified by race; consistent with racial trends in gun violence victimhood, assaults were concentrated in areas that were both low-income and with predominantly Black residents. In the highest-income block groups, relative risk of firearm assaults reached 15.8 times higher for Black residents compared with White residents, and Black residents of higher-income areas experienced firearm injury at rates similar to low-income White residents.<sup>80</sup>

## Family Structure

The nature of familial relationships and parental supervision also predict risk for youth violence perpetration or victimization. Children in single parent households or without strong relationships with their parents are more likely to be victims of gun violence. Fatherlessness has also been occasionally associated with gun and other violent crimes, but there is not sufficient evidence to conclusively link family structure to gun violence.<sup>81</sup> A study by Sumner et al. found that family interaction with child welfare services was also a significant risk factor for firearm violence perpetration.<sup>82</sup> Lacking a stable and safe home environment may contribute to increased risk of being involved in gun violence from either end.

## INDIVIDUAL HISTORY

### Victimhood

Gun violence also tends to follow a cycle of victimization and perpetuation. One study found that 57% of subjects suspected of gun crime were also previous victims of a shooting.<sup>83</sup> Moreover, as an individual's exposure to gunshot victims increases, so does that individual's odds of victimization. While peer and indirect victimization, such as witnessing a shooting, may increase the likelihood of gun-related delinquency, one study suggests that the strongest

predictor in adolescents was direct victimization.<sup>27</sup> Direct victimization had a correlation score of 0.384 with problem behavior, while peer victimization and indirect victimization had scores of 0.318 and 0.173, respectively.

## Substance Abuse

There are associations but no formally established causal links between substance abuse and the likelihood to commit or experience gun violence. In general, some of the immediate consequences of substance abuse (including impaired judgement, impulsivity, and agitation) increase the risk of violent behavior more broadly.<sup>84</sup> Additionally, the criminalization of drug use has been said to produce a culture of illegal behavior and violence.<sup>84</sup> However, it is more likely that substance abuse and gun violence are different manifestations of a single underlying issue than two distinct problems with a causal relationship.

Evidence relating frequency of smoking and drinking to rates of firearm carriage and use is inconclusive. Young and middle-aged adults with positive blood alcohol content (BAC) are more likely to use firearms than other means in suicide attempts. However, high BAC levels are not directly associated with suicide by firearm, and the BAC is negatively associated with firearm-assisted suicide attempts among older adults. Consuming more than four drinks at least once month is associated with an 80% increase in the odds of an individual carrying a concealed gun. In addition, compared to non-drinkers, very early drinkers experience a twenty-nine percent higher likelihood of carrying a gun in the past thirty days. Similarly, smokers experience higher odds of carrying a gun, and adolescent smokers in particular are more likely to be threatened by a gun.<sup>85</sup> Nevertheless, no one substance is consistently found to have stronger association with specific gun-related behavior. A report in *Epidemiological Reviews* states that the associations between substance use and gun-related behaviors were usually less significant or insignificant in most studies controlling for other factors.

## Mental Illness and Psychological Factors

Mental illness is not a strong indicator for gun violence. Experts estimate that only about four percent of criminal violence can reasonably be attributed to mentally ill individuals. Socioeconomic status and prior criminal involvement are more statistically predictive of involvement in violence than the presence of mental illness. Of the more than one million denials of potential gun purchasers since the inception of the FBI's National Instant Criminal Background Check System (NICS),<sup>i</sup> mental health issues account for only 1.4 percent.<sup>86</sup> However, the link between substance abuse and psychiatric disorders makes interpretation of gun-related behavior data difficult. Moreover, at least one study does suggest that there is a stronger association between antisocial personality disorder and gun carrying than that between alcohol/cocaine dependence and gun carrying.<sup>85</sup>

## Trends in Firearms Marketing and “Self Defense”

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<sup>i</sup> Note, however, that many states fail to report records to NICS. Lack of technical infrastructure, concerns about data confidentiality and variations in state policies create loopholes in reporting high-risk individuals to federal databases



## Pistol manufacturing in the US

The growing demand for large and 0.380 caliber pistols shows Americans' increased interest in guns designed specifically for self-defense and concealed carry.

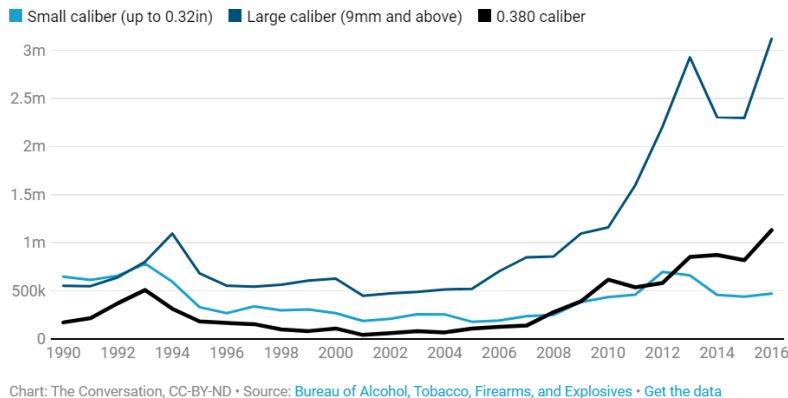


Figure 10. Small caliber, large caliber and 0.380 caliber firearms produced (in millions) over time. Figure taken from Siegal (2018).<sup>87</sup>

The United States is the world's leading gun manufacturer and exporter, as well as the only country in which guns outnumber people. U.S. companies manufactured more than 70 million firearms since 2008.<sup>88</sup> The National Rifle Association (NRA) has estimated that 25% of all American produced rifles are AR-15s or other semiautomatic weapons, while other groups have said the ratio is closer to 50%.<sup>88</sup> Data from the federal government and several large gun manufacturers suggests that firearm sales might be influenced by politics, with spikes of production coinciding with the possibility of new federal gun-control policies.<sup>88</sup> The two biggest years for gun production in recent history — 2013 and 2016 — came during intense debates about federal gun control. Sales dropped sharply in early 2017, after President Trump and Republicans took full control of government (Figure 10).<sup>88</sup>

Increased sales of high caliber handguns and semi-automatic rifles can also be attributed to gunmakers' efficacy at marketing their products as necessary for self-defense — perhaps in large part to offset a decline in demand for recreational use.<sup>87</sup> For example, after Smith & Wesson's 2005 new marketing campaign focused on "safety, security, protection and sport," sales climbed 30% in 2005 and 50% in 2006, led by strong growth in pistol sales.<sup>87</sup> Similarly, the recent widespread adoption of state "stand-your-ground laws" allow people to use guns as a first resort for self-defense in the face of a threat and therefore may normalize considering firearms for self-defense.<sup>87</sup>

Many do engage in gun ownership for safety reasons. National and local survey data have consistently found a statistically significant relationship between gun ownership and safety-related factors such as fear of crime, perceived risk, prior victimization and community crime rates.<sup>89</sup> Additionally, in the face of these perceived threats, many choose to engage in perceived self-protective measures such as personal gun ownership rather than trust or contact law enforcement. This can be due to a long-standing commitment to police avoidance and cultural repudiation of "snitching," as well as beliefs in police inefficacy or futility.<sup>89</sup> Trust in the protective capacity of law enforcement may be further damaged by experiences of mistreatment, harassment and profiling. Accordingly, individuals' trust in law enforcement, as well as perceptions of law enforcement's efficacy, also influence their propensity to engage in gun ownership as a mechanism for self-protection.

# GUN ATTAINMENT

Estimates of gun access need to look beyond legal ownership. Most guns used in violent crimes are acquired from the underground market, friends or relatives. Government-wide studies found that among state and federal prisoners who had possessed a firearm during their crime, 43% obtained the gun from the underground market and 25.3% obtained it from another individual such as a family or friend.<sup>90</sup> A study in Chicago directly asked inmates where they had acquired guns. 57% of responses were a friend and 20% were a stranger on the street. The majority of the guns were bought or stolen, but 14% of inmates received their guns as gifts.<sup>90</sup> Straw purchasing and gun trafficking are two major methods of illegal gun attainment.

Straw purchasing is the purchase of a gun on behalf of someone else. In a survey across 43 states, 9720 licensed gun retailers experienced an aggregate 33,800 attempted straw purchases and 37,000 attempted undocumented annual purchases, with firearm theft also common.<sup>20</sup> Moreover, 20% of gun dealers surveyed in California were willing to sell a gun to a person who explicitly said it was for another person.<sup>20</sup> The Giffords Law Center estimates that nationwide, approximately 20,000 dealers sell guns illegally, and that about half of gun dealers said they would be willing to make a sale under circumstances of questionable legality.<sup>91</sup>

Gun trafficking between states is also a significant issue. Studies found that about two-thirds of guns recovered from a crime in states with strong gun laws were originally sold in states with weak gun laws.<sup>92</sup> For large cities, that number may be higher; for instance, as many as 74% of New York City's recovered guns originated from out of state.<sup>93</sup> States sharing a border with weak gun laws are particularly at risk, and contiguous states with restrictive firearm legislation decrease firearm fatality more than individual state laws alone.<sup>92</sup>

## Family Possession

Although 40% of American homes have at least one gun, family possession of firearms is associated with higher risk for later violence perpetration and deadly suicide attempts.<sup>94</sup> In a study in Memphis, Seattle and Galveston, 61% of homicide or assault shootings occurred in the victim's home, and in 12% of cases the gun came from the home in which the shooting occurred.<sup>94</sup> Further studies have demonstrated that access to firearms is strongly correlated with risk of later violence perpetration.<sup>82</sup> Additionally, home gun ownership is a well-documented risk factor for adolescent suicide. Adolescents who die due to suicide are 2.1 times as likely to have a gun in their home than adolescents who unsuccessfully attempted suicide.<sup>95</sup>

Jackman et al. conducted a landmark study observing the behavior of groups of 8- to 12-year-old boys upon finding a real .380 handgun<sup>ii</sup> concealed in a drawer.<sup>96</sup> Of the 72% of the groups that discovered the handgun, 76% handled it, 48% pulled the trigger and approximately half did not believe it was real.<sup>96</sup> Parental estimates of their child's interest in guns did not predict actual behavior, and of those who handled the gun, more than 90% had previously received gun safety instruction.<sup>96</sup> Most 8- to 12-year old boys can find easily-concealed handguns and will handle them upon discovery, regardless of previous assessments of their interest in guns or exposure to gun safety instruction. This study highlights the dangers of family possession of firearms and indicates the necessity of safe firearm storage in the home.

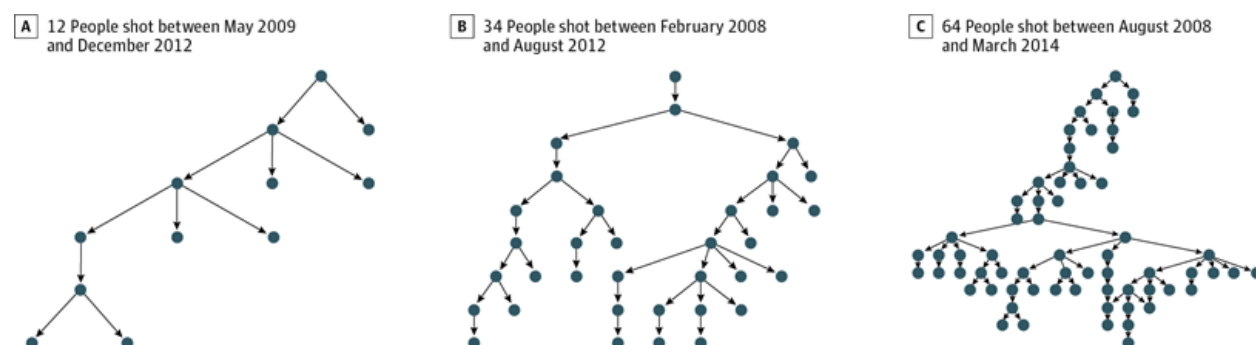
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<sup>ii</sup> The handgun used in the study was not loaded with bullets and instead emitted light whenever the trigger was depressed with sufficient force to discharge the firearm

## Peer Possession

Gun ownership and usage tend to spread through peer networks. Individuals are more likely to own and use a gun if their peers do as well. Moreover, certain peer networks constitute a disproportionate number of gun offenses in a community.

Gun violence is socially contagious and spreads through predictable patterns. A study that analyzed the social networks of arrested individuals over eight years in Chicago found that 63% of gunshot incidents occurred through connected social chains in which those who had been previously shot were at higher risk for shooting another individual.<sup>97</sup> Similarly, a study of over 3700 high-risk, co-offending individuals found that the farther an individual was from a gun homicide victim, the lower their own odds of gun homicide (95% CI: [0.27, 0.65]).<sup>98</sup> Another Chicago-based study found that every 1% increase in exposure to gunshot victims increased the odds of victimization by 1.1%.



**Figure 11.** Three cascades of gunshot violence episodes in Chicago. Figure taken from Green et al. (2017).<sup>97</sup>

Accordingly, gun violence can be very concentrated within peer networks. One of the Chicago studies found that while networks of co-offending gun users comprised less than 6% of the city's population, they constituted nearly 70% of all nonfatal gunshot victims.<sup>99</sup> Similarly, one study of 763 individuals in a Boston community found that 85% of the sample's gunshot injuries occurred within a single social network, and each network association further removed from another gunshot victim reduced one's odds of victimization by 25%.<sup>100</sup> One study also found that 75% of the subjects lived within 1 city block from where a homicide occurred, suggesting that spatial exposure influences gun perpetuation as well.<sup>98</sup> The authors proposed that living in disadvantaged neighborhoods increased the likelihood of exposure to peer violence, and exposure to peer violence increased the likelihood of weapon perpetuation.

# GUN POSSESSION BEHAVIOR PATTERNS

Along with understanding how individuals access firearms, it is essential to determine gun owners' motivation for firearm possession and common patterns of behavior among gun owners. A cross-sectional study by the University of California Davis Department of Emergency Medicine analyzed the responses of more than 2,500 individuals, including 429 self-identified gun owners. The study characterized five typical gun possession behavioral patterns.<sup>101</sup>

1. Own 5+ or more guns, including hand and non-assault-type long guns for a reason other than protection against people, i.e. hunting and recreation (31%)
2. Own 1 long gun for a reason other than protection against people (26%)
3. Own 1 handgun primarily for protection against people (21%)
4. Own 2-4 handgun and/or non-assault type long guns primarily for personal protection against people (14%)
5. Own 5+ guns including assault weapons primarily for personal protection against people most likely to carry a loaded handgun and own high-capacity magazines (9%)

These categories indicate a commonly cited motivator for owning a firearm: personal protection.<sup>62</sup> We have noted elsewhere the statistically significant relationship between gun ownership and safety-related factors such as fear of crime, perceived risk, prior victimization and community crime rates, as well as firearms producers' exploitation of this motivation in their marketing.<sup>62</sup> However, gun possession in an urban setting is not actually protective and is instead correlated to individuals being 4.46 times more likely to be shot in an assault than those not in possession of a firearm.<sup>102</sup>

Of the five categories, Group 1 individuals practiced the most secure methods of firearm storage — unloaded and locked away — while Groups 4 and 5 practiced the least secure storage practices – loaded and unlocked storage.<sup>101</sup> Although the study did not explicitly extrapolate likelihood of injury or violent behavior, the characteristics of group 5 individuals were noted as the most identifiable with an increased risk of firearm-related injury and crime.

Behavior after gun acquisition also varies by age. College students are more likely to engage in excessive risk-taking behaviors generally, including possibly life-threatening actions.<sup>103</sup> Watkins et al. found that among male juveniles in a St. Louis detention facility, the perceived threat of punishment was negatively associated with only gun possession, not gun carrying and use, while the opposite was true among adults.<sup>104</sup> Moreover, among those reporting previous experience with guns, juveniles were four times more likely to report carrying a gun on a daily basis and twice as likely to report firing a gun in the last year than adults.<sup>104</sup> This suggests that after gun acquisition, youth are unlikely to be deterred from gun carriage or use. Moreover, gang membership was a strong positive correlate of gun use, with juveniles reporting gang membership over four times as likely to report firing a gun in the past year than non-gang members.<sup>104</sup>

Having reviewed the state and risk factors of gun violence, along with the dynamics of gun acquisition and usage, we now apply this information in evidence-based recommendations.

# RECOMMENDATIONS

Any strategy to mitigate the burden of gun violence must address the issue at four key nodes:

1. Motivation for ownership
2. Access and acquisition
3. Usage for violence (including both intentional and accidental)
4. Support and health of those affected

Similarly, there are methods proven to be effective in limiting gun violence at multiple levels of society. In providing recommendations, we will organize by scale. Namely, we propose strategies at two complementary levels: community-level interventions and policy-based solutions.

## COMMUNITY-LEVEL INTERVENTIONS

### Broad Considerations

A number of programs have been researched and developed in an effort to combat gun violence at a community level. Historically, several aggressive enforcement policies such as New York City's "Stop and Frisk" have been implemented with a similar goal; however, the literature has demonstrated that communal strategies using "focused deterrence" models are generally more effective than those using enforcement models. Four important goals highlighted in recent strategies (1) reducing access to firearms (2) mending relationships between police and communities of color (3) offering more resources to communities and individuals who are at the greatest risk of engaging in gun violence and (4) engaging the community in implementing the prevention measures. Community programs benefit from collaborative work between law enforcement and mental health and substance abuse services, along with mental health and substance abuse services, family support and generalized violence prevention specifically aimed at youth who are at risk of or have been exposed to violence.<sup>105</sup>

Communities face different challenges regarding gun violence. Programs that involve social science research based on dynamics of the particular community in question, as well as detail-oriented review boards to keep track of violent incidents are also important in helping target efforts to communities at risk.<sup>105</sup> In particular, rural and urban communities demonstrate very different gun violence patterns. Urban areas tend to have higher firearm-assisted homicide rates and more concentrated gun ownership, while rural areas are characterized by higher rates of firearm-assisted suicide and accidental gun injury, as well as earlier and higher rates of gun access.<sup>67</sup> Accordingly, strategies in urban environments should emphasize disrupting specific violent social networks and homicide, while strategies in rural environments should emphasize preventing accidental injury and suicide. The models we propose here are intended to be broadly applicable but should be evaluated separately in different environments.

Urban Environments: Focused Deterrence and "Cure Violence"

Focused deterrence is the guiding principle behind community-based gun violence initiatives. Focused deterrence aims to ameliorate offender behavior by understanding the underlying dynamics and intervening early. Accordingly, this approach relies on research integrating social scientific analysis of potential causes of violent offenses, as well as academic literature on the epidemiologic spread of gun violence. This strategy also involves coordinating a response between law enforcement, social services, and community actors. For law enforcement efforts, it is important to make it known to offenders or potential offenders that they are being watched, as well as what steps they must take to avoid legal action.<sup>106</sup> One suggestion involves using gang outreach workers in areas of high gang activity to help mediate conflicts between gangs before it escalates to the use of guns.<sup>106</sup> When gun violence does occur, especially within gangs, it is important to swiftly and fairly take legal action not only to mitigate incident-specific outcomes, but also to incur spillover effects in which gangs that weren't the target of the intervention also experience a decrease in gun violence rates after seeing the consequences.<sup>106</sup>

The most famous example focused deterrence was the "Cure Violence" initiative, also known as Chicago CeaseFire. This program identified those most at risk of engaging in gun violence and intervened with those individuals to offer better ways to solve disputes.<sup>107</sup> The goal was not to use force or threaten the individuals, but instead to give them alternate conflict resolution strategies and end the normalization of violence on an individual and community level. The program utilized "violence interrupters," who were frequently former gang members with pre-established relationships and legitimacy in the community and who intervened after incidents of gang violence to discourage retaliation.<sup>107</sup> Other staffers included outreach workers, who did not need to be as closely connected to the community but still formed relationships and helped try to connect them with resources. Similar programs took place in Baltimore, Brooklyn, Phoenix, and Pittsburgh, and these provided valuable data on which methods were most successful.<sup>107</sup> Participants in these programs concluded that the most important factors in implementing a successful program were regular recording of events, conflict mediations, having knowledgeable outreach contacts, participant support, hospital contacts, and public education efforts.<sup>107</sup> Strategies from the Cure Violence initiative may be broadly applicable, particularly for urban communities with an average population size of 10,000 and at least 40 shootings per year.

Gun violence cannot be addressed independently from gang membership and violent networks. Gang involvement is highly positively correlated with gun violence, and the literature suggests that there are high chances of recidivism among violent offenders with continued presence of gang membership and its accompanying social and emotional capital.<sup>108</sup> Accordingly, strategies to address gun violence in urban environments should include efforts in social network mapping to identify high risk individuals and consider engaging former members of organized crime networks as key sources of information and potential mediators. These should be coupled with efforts to reduce the visibility of organized crime among those at high risk for joining and to provide exit strategies for those already involved.

## Law Enforcement

Engagement with law enforcement should aim to both (1) increase police efficacy in reducing community violence and (2) limit violence perpetrated by the police itself. We have demonstrated that rates of gun ownership are associated with perceptions of personal safety, as well as trust in law enforcement's legitimacy and protective capacity. Moreover, high-profile

cases of police brutality are associated with substantial declines in citizen crime reporting, as well as spikes in community violence.<sup>109</sup>

To this end, attempts to lower rates of gun ownership and gun violence should address the relationship between communities and the police. Specifically, initiatives to build trust between law enforcement and the communities they serve are essential. The U.S. Justice Department's National Initiative, implemented in six cities across the country, demonstrates successful methods to increase community trust. The National Initiative promoted procedural justice, accountability and transparency in local police departments, as well as new public-facing efforts to engage community residents, acknowledge harm and reset patterns of distrust. This resulted in marked increases in respondents who reported feeling comfortable around the police and safe in their neighborhoods.<sup>109</sup> Other important measures include increasing funding for implicit bias training to limit the practices of mistreatment, harassment and profiling, which result in many avoiding contact with law enforcement altogether. Moreover, practices such as de-escalation training for police officers – especially those who work in communities of color – not only improve law enforcement's relationships to the communities they serve, but also reduce the role of the police as agents of violence.<sup>105</sup>

### Gatekeepers and Hospital-Based Programs

One potential avenue to reduce gun violence is that of “gatekeeper training” – that is, educating and training adults who are likely to come in contact with those at-risk.

Many of those who come into contact with those working in hospitals, substance abuse clinics and psychiatry may be at high risk for future perpetration of gun violence. For instance, many of those who commit gun crime were previous victims of a shooting.<sup>83</sup> Moreover, there are associations between substance abuse and the likelihood to commit or experience gun violence, and mental illness remains a weak risk factor. Additionally, in a study in Australia, almost 50% of clergy and 25% of teachers reported that they had been approached by suicidal teens.<sup>110</sup> Accordingly, one potentially valuable strategy could be the inclusion of education, awareness and intervention programming among these individuals.

Family physicians might be particularly well positioned to play an important role in warning parents to remove guns from the home if their child is thought to be at risk of committing suicide.<sup>95</sup> One method that such healthcare providers could employ, is the use of the EnLiST acronym created by the American Academy of Pediatrics or the HELP Network for Concerned Professionals' GUNS mnemonic.<sup>111</sup> Both of these approaches aid screening for gun violence risk factors and can alert professionals to cases in which further physical or psychological treatment may be required. Physicians should also receive guidance and training on what actions will not lead to legal repercussions under the Second Amendment so that practitioners feel more secure in giving potentially life-saving assistance.

### Therapeutic Measures

Gun violence has been demonstrated to have potentially long-term physical and psychological consequences. These include post-traumatic stress symptoms such as acute stress disorder, depression and anxiety.<sup>112</sup> Those affected by gun violence should have access to high-quality and long-term care that includes infrastructure, assessments and treatment for all physical and mental health outcomes on a case-by-case basis. Survivors of mass shootings

should follow the model of care outlined previously, in which they receive care and support appropriate for the distinct acute, intermediate and long-term phases.

Efforts in this sphere should also recognize the extensive network of those who may be affected – survivors, as well as their family members, friends and emergency responders. Even those affected by gun violence only indirectly – for instance, through violence affecting their schools, neighborhoods or peers – should have access to mental health resources and be made aware of them.

Moreover, medical institutions must provide for certain vulnerable populations. African American, Hispanic and low-income populations are disproportionate victims of gun violence. However, these are also populations that are most likely to be uninsured, even after the expansion of coverage under the Affordable Care Act (ACA) lessened uninsured rates.<sup>113</sup> Efforts to increase coverage among these populations should consider strategies such as engaging enrollment assisters to communicate various ACA options in a culturally and linguistically compatible way. Similarly, members of the LGBT community are more likely to be victims of both suicides and hate crimes than the non-LGBT population, but they are also at higher risk encountering obstacles to accessing medical care.<sup>76</sup> Reports and experiences of misconduct, constraints, prejudice and verbal abuse by medical professionals reduces healthcare seeking behaviors among the LGBT population.<sup>114</sup> Accordingly, to facilitate access to care, healthcare professionals should consider interventions such as the introduction of providing LGBT-sensitive training into undergraduate curricula as well as continuing education. This should be paired with attempts to reduce discriminatory attitudes among the population at large.

Women experiencing intimate partner violence need to receive adequate care and be protected from escalation to intimate partner homicide. The WHO recommends providing conditions conducive to disclosure by emphasizing confidentiality and recognizing its limits, ensuring privacy, being nonjudgmental and supportive and assisting the woman in increasing the safety of herself and her children.<sup>115</sup> To assist in diagnosis, clinicians should ask about IPV exposure when assessing conditions that may be caused or complicated by IPV (ex. unexplained injuries).<sup>115</sup> First-line response curricula should be included in curricula for all clinicians before and after qualification, and policymakers should integrate care for survivors into health services.

## Broader Strategies

All of these strategies should be paired with education initiatives and public awareness campaigns in formal academia, as well as community-based organizations such as mutual aid and faith-based groups. Because youth are at particularly high risk, education programs in schools could have a significant impact.

Additionally, because local social mobility and income inequality are associated with gun violence rates, *PLOS Medicine* recommends in a 2019 study that governments employ economic policies to combat gun violence.<sup>79</sup> For example, policies can assist in making college more affordable to raise levels of social mobility. Additionally, tax policies that deliberately redistribute income from wealthier to lower income households can reduce poverty manner that is hypothesized to correlate to a 27% difference in the gun homicide rate.<sup>79</sup>



## POLICY-BASED SOLUTIONS

The strength of state gun laws has a strong, statistically significant impact on firearm fatalities and could reduce firearm mortality rates by nearly 10 people per 100,000.<sup>62</sup> Protective firearms legislation centers on making available firearms less deadly and preventing access to firearms, particularly for high-risk individuals. Here, we discuss model gun laws, policies to engage different members of the firearm ecosystem and political considerations.

Although many additional and promising measures have been proposed, a list of legislation found to have statistically significant associations with decreased firearm mortality, compiled by Fleegler et al. (2013) and Kalesan et al. (2018) are below.<sup>62</sup>

1. Firearm dealer regulations
  - a. State license to sell firearms
  - b. Keeping and retaining of sales records
  - c. At least one store security precaution
2. Owner purchase regulations
  - a. Firearm identification
  - b. Owner theft reporting
  - c. Child protection measures
3. Background checks or additions
  - a. Universal background checks for all firearms
  - b. Safety training or testing requirement to purchase firearms
  - c. Law enforcement involvement in obtaining of permits
  - d. Background checks for the purchase of ammunition

### Limiting Access: Expanding Background Checks and Licensing

A variety of laws aim to prevent easy access to firearms for high-risk individuals. Chief among these are measures to strengthen Brady background checks, and these measures are associated with an average of 9.80 fewer deaths per 100,000 ( $p < 0.05$ ).<sup>61</sup> The Brady Act implemented mandatory federal background checks on federally licensed firearms purchasers and a waiting period on purchases. Over three million firearm purchases have been denied since the Brady Act went into effect on February 28, 1994.<sup>116</sup> Proposed expansions to the Brady Act include implementation of universal background checks on all sales and most transfers, including at gun shows. Other expansions involve requiring a permit to purchase and imposing ammunition regulations. Permits to purchase have different levels of strictness and can include any of the following: fingerprinting, safety training and/or testing, extensions of three-day limits for background checks or involvement of law enforcement in permit process.

Research by Ruddell et al. demonstrates that states with strict background checks are associated with fewer firearm homicides, a relationship that they argue is direct cause-and-effect.<sup>117</sup> Their report states that stringent background checks on firearms purchases were significantly associated ( $p < 0.05$ ) with fewer firearms homicides, even when controlling for economic and social conditions, estimated number of circulating firearms, offenders under community supervision and violent crime.<sup>117</sup>

Other policies have been suggested to limit access to firearms specifically among high-risk individuals. Some have been successful, but qualifications for “high-risk” are often inconsistent. Evidence suggests that prohibiting gun purchases on people with a history of domestic violence and violent misdemeanors may help reduce gun violence. An analysis of seven state laws that prohibited firearm purchase from people with restraining orders for domestic violence found that its prohibition was associated with a 10% decrease in intimate partner homicides.<sup>118</sup> Additionally, permit-to-purchase laws were associated with 10% reductions in IPH rates.<sup>119</sup> Another study found that California residents who were disqualified from gun purchase due to a history of violent misdemeanors were 29% less likely to be convicted of new gun crimes than those approved for firearm purchase before the disqualifying condition.<sup>118</sup> However, other prohibiting conditions such as minimum age restrictions of 21, have not been associated with decreased risks of gun homicide and suicide.<sup>118</sup>

Certain policies have disproportionate effects between rural and urban populations, according to the Boston University School of Public Health. For instance, universal background checks have been associated with a thirteen percent reduction in urban firearm homicide rates. More generally, universal background checks and “may issue” laws (which requires that concealed carry permit applicants demonstrate a need to carry a concealed weapon) are associated with lower firearm homicide rates in large cities, but not in rural or suburban areas. In contrast, laws that disqualify people with violent misdemeanor convictions from purchasing firearms were associated with 30% lower rates of firearm-assisted homicide in rural areas.<sup>120</sup> Requiring permits to buy and carry guns appears to affect populations similarly, with roughly equivalent 20-21% lower firearm homicide rates in cities and rural/suburban populations.

Although we propose legal measures to reduce access to firearms, this access is not completely mediated by ability to legally purchase a gun. We have demonstrated that many individuals – particularly youths – are likely to obtain guns through family or peer networks, as well as illegal methods such as straw purchases and gun trafficking. Accordingly, background checks and licensing requirements have severe limitations in their application, and since the Brady Act was passed, 80% of gun violence offenders reported that they obtained firearms through social connections or private, unregulated sellers.<sup>118</sup> Nevertheless, although the large number of firearms in circulation makes it likely that an ineligible but motivated person could obtain a firearm in the secondary firearms market, effective state background checks may completely deter some and temporarily frustrate others in time for reconsideration.<sup>117</sup>

## Policies to Reduce Illegal Arms Transfers

Several additional measures may be enacted to limit illegal methods of gun attainment. The strongest laws against firearms trafficking are those that require a background check before any transfer of a firearm.<sup>91</sup> Other effective laws implemented in some states include those mentioned among the firearm dealer regulations listed above. These often involve prohibiting the sale or transfer of a firearm if the seller has knowledge or reason to believe that the buyer intends to transfer or resell the firearm without a background check, as well as laws requiring increased scrutiny of bulk gun purchases and the maintenance of records of gun sales by firearms dealers.<sup>91</sup> Giffords Law Center also recommends the identification of the source of any recovered firearm and prohibiting “community guns” used by two or more people engaged in criminal activity.<sup>91</sup> Some have also proposed investing in technological solutions as a means to limit straw purchasing and gun trafficking. One innovation is smart gun technology, which

inhibits firearm use by unauthorized users. Another is microstamping, which helps law enforcement to link cartridge cases recovered at crime scenes with the associated firearm.<sup>116</sup>

## Other Laws to Reduce Firearm Mortality

Laws that make firearms less fatal are also significantly associated with lower death rates. Fleegler et al. found that lower firearm fatalities were statistically significantly associated ( $p < 0.05$ ) with bans on assault weapons (6.35 fewer deaths per 100,000) and bans on guns in public places (also 6.35 fewer deaths per 100,000).<sup>61</sup> Other authors have pointed to solutions such as prohibiting junk guns and large-capacity magazines, but these have not consistently demonstrated efficacy.<sup>67</sup>

Fleegler et al. also found that child safety laws were significantly associated with lower rates of firearm suicide (5.84 fewer deaths per 100,000).<sup>61</sup> Measures to improve child safety include childproof guns, child safety locks, and Child Access Prevention (CAP) laws. CAP laws hold gun owners accountable for safely storing their firearms by allowing prosecutors to charge gun owners who carelessly store their firearms, including situations where a child has access to a firearm. Anderson and Sabia also found that CAP laws were associated with a 13% decrease in the rate of past month gun carrying and an 18% decrease in the rate at which students reported being threatened or injured with a weapon on school property.<sup>121</sup> However, regions with strictest CAP laws also have lower rates of gun ownership and vice versa, and there is no way to experimentally determine CAP laws in relation to school violence.

There are also certain lenient laws associated with *increased* firearm mortality. These include granting law enforcement discretion permitted when issuing concealed-carry permits, as well as Stand Your Ground laws and statutes providing gun industry immunity. On the federal level, the 2005 Protection of Lawful Commerce in Arms Act (PLCAA) grants legal protection to gun manufacturers and dealers, releasing them from liability and lawsuits for a wide range of conduct. 34 states have passed similar state statutes. Under these federal and state statutes, the gun industry is shielded from many challenges, principally that it has failed to implement safer designs and have knowingly marketed and distributed firearms in a manner which feeds an illegal secondary market.<sup>122</sup> Resisting the expansion and repealing these statutes could implement a more effective mechanism of accountability for the gun industry.

## Corporate Assistance

There are many potential nodes for intervention in addressing gun ownership. The firearm ecosystem includes suppliers to gunmakers, gunmakers, distributors, retailers, banks, credit card companies and networks, processors and investors. The majority of mass shootings over the last decade in America were financed by credit cards, and in many cases, shooters could not have afforded the guns used without access to credit cards. This has prompted some credit card companies and sellers to restrict gun sales: Paypal, Stripe, Square, Apple Pay have policies banning online transactions for sales of guns and gun-related merchandise.<sup>123</sup> Citygroup and Bank of America introduced restrictions on business customers who sell guns and said they will no longer finance or advise gun manufacturers.<sup>123</sup> Some companies including Walmart and Dick's Sporting Goods have new policies that raised age limit to purchase gun to 21, eliminated handguns from most stores, and have stopped assault-style guns (ex. AR-15s) completely.<sup>123</sup> As we have seen, rates of gun ownership are associated with rates of gun

violence. Although many using firearms do not acquire them legally, policies such as these may help limit overall access to firearms and number of guns in a community.

## Firearms Sentencing

The implementation and usage of gun laws such as 18 U.S.C. perpetuate a massive prison population in the US without proving their efficacy in reducing gun violence. Moreover, we have noted that incarceration itself has associated health costs. Some proposed solutions to address the role of gun violence in mass incarceration include provisions to limit the application of mandatory minimums. Possibilities include allowing for greater flexibility on a case-by-case basis, allowing judges to issue sentences below federal minimums and which can be served concurrently rather than consecutively.<sup>124</sup>

These policies have legislative momentum. Members of Congress and various levels of the US judicial system have publicly called for the need for reform of the mandatory minimum policy.<sup>125</sup> Members of Congress have noted that mandatory minimums have led to exacerbated growth of the federal prison system size and cost. With bipartisan support for reforming the extensive list of crimes carrying mandatory minimums, legislative members have suggested policies such as the Justice Safety Valve Act of 2013. This act aimed to allow judicial courts to sentence terms shorter than the allowed mandatory minimum for a conviction.<sup>126</sup>

Another approach is directly addressing the health outcomes of incarceration. This includes amelioration of the conditions in prison, such as providing greater nutrition, access to medical care (including mental health care) and environments with greater ventilation and less crowding to prevent the transmission of infectious disease. Strategies also include support for those after incarceration and re-entering society, including assistance in enrolling in insurance policies and facilitating access to programs that help prevent and treat substance abuse. The prevention of substance abuse is particularly important given the high rates of relapse and substance abuse disorders.

A final prospect for potential criminal justice reform is restorative justice, which seeks to rehabilitate previously incarcerated people through reconciliation with victim groups and the larger community impacted by the actions of the assaulter.<sup>127</sup> Restorative justice is meant to reduce the number of petty crimes that occur as assaulters reconcile with the impact of their actions.<sup>127</sup> Because restorative justice focuses on the individual's contact and development of a relationship of forgiveness between assaulter and victims, this direct method may not be scalable to gun violence convictions. However, one potential avenue of restorative justice in gun violence is the idea of violence interrupters in the focused deterrence programs mentioned previously. By working with reformed individuals that have previously been convicted of gun violence to advocate and intervene in their communities, there is the potential to reduce the overall rates of gun violence and the respective rates of incarceration.

## Political Considerations

Any policies to modify gun laws must consider political realities. According to a 2020 Gallup poll, while 42% of Americans want stricter gun laws, an equal percentage are very satisfied or somewhat satisfied with the state of gun control, 9% want less strict laws, 9% are dissatisfied but don't want to change the law and 3% have no opinion.<sup>128</sup> The same poll, however, found that 92% of respondents supported requiring background checks for all guns sales, 68% supported raising the legal age at which people can purchase certain firearms from

18 to 21 and 56% supported banning the sale of semi-automatic weapons such as the AR-15. Polls by Quinnipiac and NPR have similarly demonstrated that 77% of respondents support requiring gun licenses for purchase and that 89% of respondents favor federal red flag laws, which allow police to temporarily seize guns if someone reports seeing something that indicates that a gun-owner may be a risk to themselves or others.<sup>129</sup>

Measures must be taken to not only develop strategies to reduce gun violence, but also to implement them. This implies identifying where expanded gun control measures might be politically feasible. Subsequently, among regions with greater psychological and ideological barriers, efforts should be made in community organizing and education about the enormous costs of gun violence.

# OTHER COSTS

This report focuses on the health consequences of gun violence. However, some of these outcomes are not immediately self-evident, passed through filters such as impacts on education and economics. Moreover, it is critical to acknowledge the many other ways gun violence can harm people's wellbeing and livelihood. Here, we briefly describe several of the many other effects of gun violence, which in turn may have their own associated health costs.

## Education

Gun violence is an educational issue, especially as it relates to chronic absenteeism in the classroom. According to the Pew Research Center, 57% of teens say that they are worried about the possibility of a shooting happening in their school. Of these, non-White teens express a higher level of concern than their White peers, and girls express a higher level of concern than boys.<sup>130</sup> These fears and anxieties can negatively impact students' education and ability to learn. Moreover, trauma from experiences or secondhand stories regarding gun violence can result in students missing enough school to negatively impact academic achievement.<sup>131</sup> One study found that students who had been exposed to gun violence, including hearing gun shots and watching a shooting, had higher rates of truancy ( $p=0.02$ ).<sup>22</sup> Gun violence damages the learning environment causes insecurity and reducing retention, and student absenteeism can lead to other negative outcomes in future unemployment, crime, and violence.<sup>132</sup>

## Economic Costs

In addition to its human cost, gun violence also has enormous associated economic costs, especially at the local level. Medical costs associated with treating firearm injuries create challenges for insurance providers and increased expenses for taxpayers. A 2017 report found that gun violence creates immediate costs of around \$23,000 per patient, and in 2010 alone, emergency room visits from 36,000 victims of firearm assaults resulted in a total cost of \$630 million in medical treatment.<sup>133</sup> 52% was charged to taxpayers through publicly funded health insurance, and 28% was billed to people who lacked health insurance.<sup>12</sup> Costs increase an additional \$410 million when considering mental health treatment, and Cook and Ludwig estimated \$20–26 billion dollars in lost earnings as a result of gun violence in 1997.<sup>134</sup> Without gun violence, hospitals would save millions of dollars and more money can be allocated for investment elsewhere.

In addition to these immediate healthcare costs, the financial burden of gun violence is also present in business and real estate. The same report found that surges in gun violence can significantly slow home value appreciation and cited a 2006 analysis finding that each additional violent crime per 1,000 in low-income neighborhoods was related to a 3.6% decline in home values the following year.<sup>133</sup> This represents an average loss of \$4,144 in value in already-poor neighborhoods. High levels of neighborhood gun violence can be associated with fewer retail and service establishments and fewer new jobs, as well as lower credit scores and homeownership rates.<sup>133</sup> Moreover, the fear associated with high rates of gun violence has a financial impact when it results in greater amounts of money spend on protective measures such as home security technologies.<sup>133</sup>

# CONCLUSION

Research on gun violence in America has been stifled for decades, despite America's exceptionally high rate of firearm-related deaths. Young people have already lived through the deadliest mass shootings in modern American history, as well as widespread and persistent daily violence. Gun violence can result in devastating physical and psychological trauma, as well as such far-flung effects as school attendance, mass incarceration and substance abuse. After a shooting, the consequences of gun violence continue to affect survivors, family members, peer groups and communities – particularly those most marginalized due to their race and socio-economic status.

That being said, recent events have demonstrated that this situation is not inevitable. Clarifications of federal law in 2018 have loosened restrictions on long-silenced gun violence research. A wave of firearms legislation was enacted in 26 states and D.C. following the Parkland massacre, and there is political momentum for more. Students have emerged as remarkable leaders in spearheading an extremely powerful protest movement, leveraging their personal narratives and extending solidarity to others across America.

We have gathered the overwhelming evidence that actionable solutions are available. Certain cities such as Chicago have enacted programs targeting high-risk networks in “focused deterrence” to reduce violent behavior, offer resources and stop violence before it happens. Several police departments are implementing increased training and engagement policies to better serve their communities and have already demonstrated returns in local safety and trust. Legislation passed in some states in expanding background checks and permits, as well as limiting the sale of dangerous weapons, has proven effects in limiting firearm mortality. Other proposed solutions in engaging community members such as doctors, clinic workers, teachers and faith leaders also have the potential to protect many more, particularly those most at risk. We must continue to advocate for these policies and expand on them.

This report reviews the state and nature of firearm-related morbidity and mortality, as well as concrete measures to address it. In doing so, we hope to contribute to the conversation on the public health crisis of gun violence.

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