

## **Harvard Injury Control Research Center**

Firearms Research Publications through December 2018

Since 1990, HICRC's small team of researchers has published 150 books, book chapters and journal articles on guns, along with various editorials, letters, responses, encyclopedia entries, etc. Among many accomplishments, Center research was:

1. The first to describe national gun storage practices—and to show that firearm owners who have received training are not more likely to store their guns safely.
2. The first to determine what is actually taught in firearm training classes
3. The first to show that members of the National Rifle Association support most sensible gun control laws.
4. The first to document the various ways guns are used by batterers to intimidate their intimate partners.
5. The first to document the psychological costs of gun ownership on the community.
6. The first to explain the large overestimates of self-defense gun use.
7. The first to demonstrate that most so-called self-defense gun use is illegal, and inimical to society.
8. The first to document the association between gun carrying in motor vehicles and road rage.
9. The first to determine whose guns are being stolen.
10. The first to provide national information on guns on college campuses, and the type of students who bring guns to college.
11. The first to document that the majority of inner-city teens who have carried guns illegally would prefer to live in a world where it was impossible for teens such as themselves to have access to firearms.
12. The first to document that the major reason why both rates of killings of police and killings of civilians by police vary so greatly across US states.

The Center also showed the contagious nature of adolescent gun carrying and documented the strong association between household gun ownership levels and violent death to children and to women—deaths from homicide, suicide and gun accidents. The Center was among the first to document that boys commonly

play with household firearms without adult supervision or knowledge and among the first to advocate for bean bag guns, tasers, and other less lethal weapons for police. A Center study provides the current best estimate of the number of guns in America and the percentage of gun transfers occur without a background check.

Four of our major accomplishments have been:

- (a) making the case that violence is a public health problem;
- (b) promoting and creating a working model for the National Violent Death Reporting System;
- (c) providing overwhelming scientific evidence that a gun in the home increases the risk of completed suicide; and
- (d) working with gun advocates to disseminate ways to reduce rates of gun suicide.

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Books:

1. Henigan, Dennis A; Nicholson EB, **Hemenway, David**. *Guns and the Constitution*. Northampton, MA: Aletheia Press, 1995. The last chapter of this short book, "Guns, Public Health and Public Safety," contains an interview with David Hemenway that explains the public health approach for reducing firearm injury.

2. **Hemenway, David**. *Private Guns and Public Health*. Ann Arbor, MI: University of Michigan Press, 2017. This book summarizes the literature on the relationship between guns and injuries and describes the public health approach to reducing firearm-related violence. The hardcopy came out in 2004, a paper edition with an Afterward summarizing the 2004-05 scientific literature was published in 2006, and the paperback was re-published in 2017 with a new cover and a new introduction summarizing the literature and the major events of the previous decade.

## Homicide:

### **1. Where there are more guns there is more homicide (literature review)**

Our review of the academic literature found that a broad array of evidence indicates that gun availability is a risk factor for homicide, both in the United States and across high-income countries. Case-control studies, ecological time-series and cross-sectional studies indicate that in homes, cities, states and regions in the U.S., where there are more guns, both men and women are at a higher risk for homicide, particularly firearm homicide.

**Hepburn, Lisa; Hemenway, David.** Firearm availability and homicide: A review of the literature. *Aggression and Violent Behavior: A Review Journal*. 2004; 9:417-40.

### **2. Across high-income nations, more guns = more homicide**

We analyzed the relationship between homicide and gun availability using data from 26 developed countries from the early 1990s. We found that across developed countries, where guns were more available, there were more homicides. These results often held even when the United States was excluded.

**Hemenway, David; Miller, Matthew.** Firearm availability and homicide rates across 26 high income countries. *Journal of Trauma*. 2000; 49:985-88.

### **3. Across states, more guns = more homicide**

Using a validated proxy for firearm ownership, we analyzed the relationship between firearm availability and homicide across 50 states over a ten-year period (1988-1997).

After controlling for poverty and urbanization, for every age group, people in states with many guns had elevated rates of homicide, particularly firearm homicide.

**Miller, Matthew; Azrael, Deborah; Hemenway, David.** Household firearm ownership levels and homicide rates across U.S. regions and states, 1988-1997. *American Journal of Public Health*. 2002; 92:1988-1993.

### **4. Across states, more guns = more homicide (2)**

Using survey data on rates of household gun ownership, we examined the association between gun availability and homicide across states, 2001-2003. We

found that states with higher levels of household gun ownership had higher rates of firearm homicide and overall homicide. This relationship held for both genders and all age groups, after accounting for rates of aggravated assault, robbery, unemployment, urbanization, alcohol consumption, and resource deprivation (e.g., poverty). There was no association between gun prevalence and non-firearm homicide.

**Miller, Matthew; Azrael, Deborah; Hemenway, David.** State-level homicide victimization rates in the U.S. in relation to survey measures of household firearm ownership, 2001-2003. *Social Science and Medicine*. 2007; 64:656-64.

## **5. A summary of the evidence on guns and violent death**

This book chapter summarizes the scientific literature on the relationship between gun prevalence (levels of household gun ownership) and suicide, homicide and unintentional firearm death and concludes that where there are higher levels of gun ownership, there are more gun suicides and more total suicides, more gun homicides and more total homicides, and more accidental gun deaths.

This is the first chapter in the book and provides an up-to-date and readable summary of the literature on the relationship between guns and death. It also adds to the literature by using the National Violent Death Reporting System data to show where (home or away) the shootings occurred. Suicides for all age groups and homicides for children and aging adults most often occurred in their own home.

**Miller M, Azrael D, Hemenway D.** Firearms and violence death in the United States. In: Webster DW, Vernick JS, eds. *Reducing Gun Violence in America*. Baltimore MD: Johns Hopkins University Press, 2013.

## **6. More guns = more homicides OF police**

This article examines homicide rates of Law Enforcement Officers (LEOs) from 1996 to 2010. Differences in rates of homicides of LEOs across states are best explained not by differences in crime, but by differences in household gun ownership. In high gun states, LEOs are 3 times more likely to be murdered than LEOs working in low-gun states.

This article was cited by President Obama in a speech to a police association. This article will hopefully bring police further into the camp of those pushing for sensible gun laws.

Swedler DI, Simmons MM, Dominici F, **Hemenway D**. Firearm prevalence and homicides of law enforcement officers in the United States. *American Journal of Public Health*. 2015; 105:2042-48.

### **7. More guns = more homicide BY police**

US states with high levels of household gun ownership had higher rates of fatal shootings of civilians by police, even after adjusting for rates of violent crime, poverty, urbanization and racial composition. The relationship between gun levels and police killings was strongest for rates of police shootings of victims who were armed with guns. The rate of fatal police shootings in the high-gun states was 3.6 times greater than in the low-gun states.

**Hemenway D, Azrael D, Conner A, Miller M**. Variation in rates of fatal police shootings across US states: the role of firearm availability. *Journal of Urban Health*. 2018

## Suicide:

### **1-2. Gun availability is a risk factor for suicide (literature reviews)**

We performed reviews of the academic literature on the effects of gun availability on suicide rates. The preponderance of current evidence indicates that gun availability is a risk factor for youth suicide in the United States. At the turn of the century, the evidence that gun availability increases the suicide rates of adults was credible, but was less compelling. Most of the disaggregate findings of particular studies (e.g. handguns are more of a risk factor than long guns, guns stored unlocked pose a greater risk than guns stored locked) were suggestive but not yet well established.

**Miller, Matthew; Hemenway, David.** The relationship between firearms and suicide: A review of the literature. *Aggression and Violent Behavior: A Review Journal*. 1999; 4:59-75.

**Miller, Matthew; Hemenway, David.** Gun prevalence and the risk of suicide: A review. *Harvard Health Policy Review*. 2001; 2:29-37.

### **3. Across states, more guns = more suicide (cross sectional analyses)**

Using a validated proxy for firearm ownership rates, we analyzed the relationship between firearm availability and suicide across 50 states over a ten-year period (1988-1997). After controlling for poverty and urbanization, for every age group, across the United States, people in states with many guns had elevated rates of suicide, particularly firearm suicide.

**Miller, Matthew; Azrael, Deborah; Hemenway, David.** Household firearm ownership levels and suicide across U.S. regions and states, 1988-1997. *Epidemiology*. 2002; 13:517-524.

### **4. Across states, more guns = more suicide (2) (cross sectional analyses)**

Using survey data on rates of household gun ownership, we examined the association between gun availability and suicide across states, 1999-2001. States with higher levels of household gun ownership had higher rates of firearm suicide and overall suicide. This relationship held for both genders and all age groups. It remained true after accounting for poverty, urbanization and unemployment. There was no association between gun prevalence and non-firearm suicide.

**Miller, Matthew; Lippmann, Steven; Azrael, Deborah; Hemenway, David.** Household firearm ownership and rates of suicide across U.S. states. *Journal of Trauma*. 2007; 62:1029-35.

### **5. Across states, more guns = more suicides (time series analysis)**

Using survey data on rates of household gun ownership, we examined the association between gun availability and suicide over time, 1981-2001. Changes in the levels of household firearm gun ownership was significantly associated with changes in both firearm suicide and overall suicide, for men, women and children, even after controlling for region, unemployment, alcohol consumption and poverty. There was no relationship between changes in gun ownership and changes in non-firearm suicide.

**Miller, Matthew; Azrael, Deborah; Hepburn, Lisa; Hemenway, David; Lippman, Steven.** "The association between changes in household firearm ownership and rates of suicide in the United States, 1981-2002." *Injury Prevention*. 2006; 12:178-82.

### **6. Across states, more guns = more suicide (Northeast)**

We analyzed data on suicide and suicide attempts for states in the Northeast. Even after controlling for rates of attempted suicide, states with more guns had higher rates of suicide.

**Miller, Matthew; Hemenway, David; Azrael, Deborah.** Firearms and suicide in the Northeast. *Journal of Trauma*. 2004; 57:626-632.

### **7. Across U.S. regions, more guns = more suicide (cross sectional analysis)**

We analyzed the relationship of gun availability and suicide among differing age groups across the 9 US regions. After controlling for divorce, education, unemployment, poverty and urbanization, the statistically significant relationship holds for 15 to 24 year-olds and 45 to 84 year-olds, but not for 25 to 44 year-olds.

**Birckmayer, Johanna; Hemenway, David.** Suicide and gun prevalence: Are youth disproportionately affected? *Suicide and Life Threatening Behavior*. 2001; 31:303-310.

### **8. Differences in mental health cannot explain the regional more guns = more suicide connection**

We analyzed the relationship of gun availability and suicide among differing age groups across the 9 US regions. Levels of gun ownership were highly correlated with suicide rates across all age groups, even after controlling for lifetime major depression and serious suicidal thoughts.

**Hemenway, David; Miller, Matthew.** The association of rates of household handgun ownership, lifetime major depression and serious suicidal thoughts with rates of suicide across US census regions. *Injury Prevention*. 2002; 8:313-16.

## **9. Gun owners do not have more mental health problems than non-owners**

We added questions to, and analyzed data from the National Comorbidity Study. Gun owning households do not have more mental health problems than non-gun owning households; differences in mental health do not explain why gun owners and their families are at higher risk for completed suicide than non-gun owning families.

**Miller, Matthew; Molnar, Beth; Barber, Catherine; Hemenway, David; Azrael, Deborah.** Recent psychopathology, suicidal thoughts and suicide attempts in households with vs. without firearms: findings from the National Comorbidity Study Replication. *Injury Prevention*. 2009; 15:183-87.

## **10. Gun owners are not more suicidal than non-owners**

We analyzed data from the Second Injury Control and Risk Survey, a 2001-2003 representative telephone survey of U.S. households. Of over 9,000 respondents, 7% reported past-year suicidal thoughts, and 21% of these had a plan. Respondents with firearms in the home were no more likely to report suicidal thoughts, plans or attempts, but if they had a suicidal plan, it was much more likely to involve firearms. The higher rates of suicide among gun owners and their families cannot be explained by higher rates of suicidal behavior, but can be explained by easy access to a gun.

Betz, Marian E; **Barber, Catherine; Miller, Matthew.** Suicidal behavior and firearm access: results from the second injury control and risk survey (ICARIS-2). *Suicide and Life Threatening Behaviors*. 2011; 41:384-91.

## **11. Adolescents who commit suicide with a gun use the family gun**

The vast majority of adolescent suicide guns come from parents or other family members.

**Johnson, Rene M; Barber, Catherine; Azrael, Deborah;** Clark, David E; **Hemenway, David.** Who are the owners of firearms used in adolescent suicides? *Suicide and Life Threatening Behavior.* 2010; 40:609-611.

## **12. The case-fatality rate for suicide attempts with guns is higher than other methods**

Across the Northeast, case fatality rates ranged from over 90% for firearms to under 5% for drug overdoses, cutting and piercing (the most common methods of attempted suicide). Hospital workers rarely see the type of suicide (firearm suicide) that is most likely to end in death.

**Miller, Matthew; Azrael, Deborah; Hemenway, David.** The epidemiology of case fatality rates for suicide in the Northeast. *Annals of Emergency Medicine.* 2004; 723-30.

## **13. The public does not understand the importance of method availability**

Over 2,700 respondents to a national random-digit-dial telephone survey were asked to estimate how many of the more than 1,000 people who had jumped from the Golden Gate Bridge would have gone on to commit suicide some other way if an effective suicide barrier had been installed. Over 1/3 of respondents estimated that none of the suicides could have been prevented. Respondents most likely to believe that no one could have been saved were cigarette smokers and gun owners.

**Miller, Matthew; Azrael, Deborah; Hemenway, David.** Belief in the inevitability of suicide: Results from a national survey. *Suicide and Life Threatening Behavior.* 2006; 36:1-11.

## **14. Physicians need to do more to help reduce access to lethal means**

This commentary presents the overwhelming evidence that the availability of lethal means increases the suicide rate and argues that physicians need to take an active role in reducing access for potentially suicidal individuals.

**Miller, Matthew; Hemenway, David.** Guns and suicide in the United States. *The New England Journal of Medicine.* 2008; 359:989-991.

## **15. Emergency department physicians and nurses rarely counsel about lethal means restriction**

In one Boston emergency department (ED), ED physicians and nurses believe they should counsel suicidal patients on lethal means restriction, but they often don't. Psychiatrists working at the ED were much more likely to ask about firearms.

Betz, Marian E; **Barber, Catherine; Miller, Matthew**. Lethal means restriction as suicide prevention: Variation in belief and practices among providers in an urban ED. *Injury Prevention*. 2010; 16:278-81.

## **16. Emergency department physicians and nurses do not believe lethal means restriction can prevent suicide**

Physicians and nurses at 8 emergency departments (n = 631) were surveyed about their practices and beliefs concerning means restriction and whether they asked their patients about guns. The proportion of providers who reported that they "almost always" ask suicidal patients about firearm access varied across five patient scenarios: 64% would ask a suicidal patient whose suicide plan involved firearms and 21% would ask a suicidal patient who did not have a specific plan. Less than half believed that most suicides are preventable; two-thirds of nurses thought that most or all firearm suicide decedents would have died by another method if the firearm had not been available.

Many ED nurses and physicians do not understand the importance of the availability of lethal means in determining whether or not a suicide attempt ends in death. The Means Matter Campaign needs to continue educating these professionals.

Betz, Marian E; **Miller, Matthew; Barber, Catherine** et al. Lethal means restriction for suicide prevention: Beliefs and behaviors of emergency department providers. *Depression and Anxiety*. 2013; 10:2013-20.

## **17. Mental health providers can be trained to reduce the risk of gun suicide**

The Counseling on Access to Lethal Means (CALM) workshops were effective in improving mental health care providers' attitudes, beliefs and skills regarding lethal means counseling.

**Johnson, Rene M;** Frank, Elaine; Ciocca, Mark; **Barber, Catherine**. Training mental health providers to reduce at-risk patients' access to lethal means of suicide: Evaluation of the CALM project. *Archives of Suicide Research*. 2011 15(3): 259-264.

## **18. Suicide training in means reduction can be accomplished via the Internet**

This article describes Harvard Injury Control Research Center's (HICRC) National Center for Suicide Prevention Training, which uses the public health approach and includes training on means restriction.

**Stone, Deborah; Barber, Catherine,** Posner, Marc. Improving public health practice in suicide prevention through online training: A case example. In: Sher, Leo & Vilens, Alexander, eds. *Internet and Suicide*. New York: Nova Science, 2009.

## **19. Lethal means reduction strategies can successfully reduce suicide**

This article summarizes recent additions to the scientific literature about means restriction policies and suicide.

**Johnson, Rene M;** Coyne-Beasley, Tamera. Lethal means reduction: What have we learned? *Current Opinion in Pediatrics*. 2009; 21: 635–640

## **20. Veterans have high rates of firearm suicide**

There are no differences in suicide risk among middle-aged and older male veterans and non-veterans. Suicide by firearm is higher, suicide by non-firearm is lower. It is probable that lower baseline risk of active duty soldiers (healthy worker effect) tends to be counterbalanced by the accessibility of firearms to these veterans.

**Miller, Matthew; Barber, Catherine; Azrael, Deborah,** Calle, Eugenia E; Lawler, Elizabeth; Mukamal, Kenneth J. Suicide among US veterans: A prospective study of 500,000 middle-aged and elderly men. *American Journal of Epidemiology*. 2009; 170:494-500.

## **21. There are effective ways to reduce suicide without affecting mental health**

This introduction to suicide as an international public health problem examines the role of promoting mental health, changing cultural norms, and reducing the availability of lethal means in preventing suicide.

**Barber, Catherine; Miller, Matthew.** A public health approach to preventing suicide. In: Finkel, Madelon L. *Perspectives in Public Health: Challenges for the Future*. Santa Barbara CA: Praeger Publishers, 2010.

## **22. Differences in suicide rates across the U.S. are best explained by gun prevalence**

This summary of the scientific literature on suicide in the United States emphasizes the importance of levels of household firearm ownership in explaining different rates of suicide over time and across states, households and genders.

**Miller, Matthew; Azrael, Deboarh; Barber, Catherine.** Suicide mortality in the United States: The importance of attending to method in understanding population-level disparities in the burden of suicide. *Annual Review of Public Health.* 2012; 33:393-408.

## **23. Reducing access to lethal means can begin to reduce suicide rates today**

This editorial in an issue of the flagship public health journal devoted entirely to veteran suicide emphasizes the importance of the availability of firearms in determining whether suicide attempts prove fatal.

**Miller, Matthew.** Preventing suicide by preventing lethal injury: The need to act on what we already know. *American Journal of Public Health.* 2012; 102(S1):e1-3.

## **24. The main factor explaining differences in suicide rates across states is gun ownership, not rates of suicide attempts**

Using data from recently available state-level suicide attempt data, this study examines whether the association between state-level firearm ownership and completed suicide remains after accounting for suicide attempt rates. Results show that firearm ownership rates – independent of underlying rates of suicidal behavior – largely explain the variation in suicide mortality across the 50 states.

This study answers skeptics of the empirical literature who claim that the association between firearm ownership and suicide mortality reflects unmeasured suicidal proclivities associated with firearm ownership.

**Miller, Matthew; Barber, Catherine; Azrael, Deborah; White R.** Firearms and suicide in the United States: Is risk independent of underlying suicidal behavior? *American Journal of Epidemiology.* 2013; 178: 946-55.

## **25. U.S. cities with more guns have higher rates of suicide because of higher rates of gun suicide**

Across metropolitan statistical areas that are comprised of large U.S. cities, higher rates of firearm ownership are strongly associated with higher rates of firearm suicide and overall suicide, but not with non-firearm suicide. This study provides evidence consistent with previous case-control work and ecological studies across states and regions that firearms in the home increase the suicide risk.

We had previously shown that levels of household gun ownership largely explain the differences in suicide rates across regions and states. This article shows that gun ownership levels also explain much of the differences in suicide rates across cities. It is not altitude or remoteness from medical care facilities that can explain this gun-suicide connection.

**Miller M, Warren M, Azrael D, Hemenway D.** Firearms and suicide in US cities. *Injury and Prevention*. 2015; 21:e116-e119.

## **26. Firearms dealers can help prevent suicide**

This article describes the New Hampshire gun shop project. After a spate of firearm suicides, a committee of firearm dealers, firearm rights advocates, and suicide prevention professionals including HICRC worked on ways to help gun shops help prevent suicide. Within a couple of years, half of New Hampshire gun shops were using suicide prevention materials developed by the committee.

The gun shop project has become a model of cooperation between public health professionals and gun advocates, a model that is being rolled out throughout the nation. This is the first academic article describing the cooperation and documenting its success. HICRC personnel took the lead on the campaign's written materials and the pre- and post-campaign interviews with gun shop owners.

**Vriniotis M, Barber C, Frank E,** Demicco R, and the NH Firearm Safety Coalition. A suicide prevention campaign for firearm dealers in New Hampshire. *Suicide and Life-Threatening Behavior*. 2015; 45(2): 157-163.

## **27. This article prioritizes the research needed to make a means restriction approach successful**

This paper describes (a) the evidence about guns and suicide; (b) the types of voluntary programs (not command-and-control legislation) that will reduce firearm suicides, and (c) the research needed that can help create effective programs.

The National Action Alliance for Suicide Prevention and the National Institute of Mental Health (NIMH) asked HICRC to write priorities for firearm research. This article describes a research agenda that will provide the knowledge to make a means restriction approach successful.

**Barber C & Miller M.** Reducing a suicidal person's access to lethal means of suicide: A research agenda. *American Journal of Preventive Medicine*. 2014; 47(3):S264-72.

## **28. Guns, not antidepressant medication, explain the variants in suicide across the U.S.**

This cross-sectional analysis of U.S. counties and states shows that differences in rates of suicide are not explained by differences in antidepressant medication, but are explained by levels of household firearm ownership.

Some mental health professionals have been claiming that antidepressant medication deserves the credit for the fall in suicide in the 1990s, and is the major reason some states have low suicide rates. This article shows that it's the guns.

**This article received the Jess Krauss award as the best article in *Injury Epidemiology* for the year 2014.**

**Opoliner A, Azrael D, Barber C, Fitzmaurice G, Miller M.** Explaining geographic patterns of suicide in the U.S.: The role of firearms and antidepressants. *Injury Epidemiology*. 2014; March 20, 1:6.

## **29. A summary for psychiatrists of the evidence on guns and suicide**

This essay summarizes the evidence concerning guns and suicide for a leading psychiatry textbook on violence and mental illness. It is part of our ongoing work to educate medical professionals to become knowledgeable about and advocates for the Means Matter approach to suicide prevention.

**Miller M, Barber C, Azrael D.** Firearms and suicide in the U.S. In: Gold LH, Simon RI eds. *Gun Violence and Mental Illness*. Arlington, VA: American Psychiatric Publishing. 2015.

### **30. A summary for sociologists of the evidence on guns and suicide**

This essay, in the leading suicide textbook in the field, should help medical professionals to begin to use the Means Matter approach at the individual patient level and to promote it at the societal level.

**Azrael D, Miller M.** Reducing access to lethal means: A review of the evidence base. In: *The International Handbook of Suicide and Attempted Suicide, 2<sup>nd</sup> ed.* West Sussex, England: John Wiley & Sons. 2015.

### **31. Guns alone explain the gun-suicide connection**

This article demonstrates that it is virtually impossible for unmeasured confounding to explain the association between firearms and suicide. The association is a real one.

Historically, the tobacco lobby claimed that the association between cigarettes and cancer could possibly be explained by some unknown risk factor for both. This assertion was finally refuted when scientists showed the absurd degree of association between both that such an unmeasured confounder would have to have. This article uses the same refutation for those who try to deny the causal association between guns and suicide.

**Miller M, Swanson SA, Azrael D.** Are we missing something pertinent? A bias analysis of unmeasured confounding in the firearm-suicide literature. *Epidemiologic Reviews.* 2016; 38(1):62-9.

### **32. Training increases whether providers ask about suicide**

This study evaluated, via self-report, an intervention to change provider attitudes and practices related to suicide risk assessment at emergency departments (EDs). Clinicians were trained in conducting universal risk assessment, but there was not training on lethal means counseling. There was a large increase in the percentage of providers reporting universal screening and secondary assessment of suicide risk. The proportion of nurses reporting asking suicidal patients about firearm access increased (the proportion of doctors asking did not change). Still, the numbers asking remained low relative to ideal practice.

Getting more providers to ask about firearms should help reduce suicides. The findings support the feasibility of implementing universal screening for suicide in EDs and points to the need for specific training in lethal means counseling.

Betz ME, Arias AA, **Miller M, Barber C**, et al. Change in emergency department providers' beliefs and practices after new protocols for suicidal patients. *Psychiatric Services*. 2015; 66:625-31.

### **33. Patients appreciate counseling about firearms**

Sixteen psychiatric emergency clinicians were trained via an online course written by HICRC to provide lethal means counseling with parents of patients under 18 years receiving care for suicidality. Interviews with 114 families found that parents had favorable impressions of the counseling and good recall of the main messages. Everyone who reported there were guns in the home at the time of the visit reported at follow-up that all were currently locked, compared to 67% reporting this at the time of the visit.

The project demonstrates the feasibility of a Means Matter intervention for families with at-risk children.

Runyan C, Becker A, Brandspigel S, **Barber C**, Trudeau A, Novins D. Lethal means counseling for parents of youth seeking emergency care for suicidality. *Western Journal of Emergency Medicine*. 2016; 17:8-14.

### **34. Many emergency department physicians fail to ask suicidal patients about firearms**

In a study of eight emergency departments, half of patients treated for suicide ideation or attempts, who had firearms in the home, had not been assessed for access to lethal means.

This study demonstrates the importance of training in lethal means counseling since lethal means assessment in emergency departments is still not the norm.

Betz ME, **Miller M, Barber C**, Betty B, Miller I, Camargo CA, Bourdreaux ED. Lethal means access and assessment among suicidal emergency department patients. *Depression and Anxiety*. 2016; 33(6):502-11.

### **35. Ecological studies as well as case-control studies are important in understanding the connection of guns and violent death**

The solicited commentary emphasizes the importance of the ecological studies of guns and suicide --- that they overcome the "ecological fallacy." The commentary also argues that ecological studies may be superior to case-control studies dealing with guns and homicide since men are usually shot outside the home with someone else's gun. The commentary shows that there is strong

ecological evidence of the gun-suicide connection in addition to the solid evidence from the case-control studies.

This commentary makes the case that the case-control studies analyzed in a recent meta-analysis provide only one part of the evidence that a gun in the home increases the risk of suicide. Adding ecological (and other) studies makes the case overwhelming.

**Hemenway D.** Guns, suicide, and homicide: Individual-level versus population-level studies (Commentary). *Annals of Internal Medicine*. 2014 Feb; 160:134-135.

### **36. Public health experts and gun owner groups are working together to reduce suicide.**

This article describes the work HICRC has done over the past decade in finding common ground with gun owners to reduce firearm suicide. Gun owner groups are seen as part of the solution rather than part of the problem of suicide in America. Suicide is a gun owner's issue—gun owning families are at higher risk for suicide. Partnerships among gun shop owners, firearm instructors, gun rights stakeholders and health professionals help to change social norms about guns and suicide, and can save lives.

**Barber, Cathy; Frank, Elaine;** Demicco, Ralph. Reducing suicides through partnerships between health professionals and gun owner groups—beyond docs vs glocks. *JAMA-Internal Medicine*. 2017; 177 (1):5-6.

### **37. Physicians can help reduce suicide—without changing anyone's mental health.**

This commentary describes effective ways physicians and others who see people in crisis can reduce suicide. Many major successes in suicide prevention focused on reducing access to the lethal means of suicide rather than on solving mental health problems. In the United States, while 1% of suicide attempts are with guns, half of completed suicides are gun suicides. The commentary provides information on how physicians and others can help change social norms and reduce suicide by communicating this message: putting time and distance between a suicidal person and a gun can save a life.

**Barber, Catherine; Hemenway, David; Miller, Matthew.** How physicians can reduce suicide—without changing anyone's mental health” *American Journal of Medicine* (“the green journal”) 2016; 129(10):1016-7.

### **38. Few Americans understand that a gun in the home increases the risk of completed suicide**

While the overwhelming majority of firearms researchers and suicide experts agree that a gun in the home increases the risk of suicide, that knowledge has yet to reach the general population. HICRC's national firearm survey finds that only 15% of Americans agree that the presence of a firearm in the home increases the risk for suicide, and only 30% of health care practitioners agree. Clearly more education about the scientific findings is needed.

**Conner, Andrew; Azrael, Deborah; Miller, Matthew.** Public opinion about the relationship between firearm availability and suicide: results from a national survey. *Annals of Internal Medicine*. 2018; 168(2):153-55.

### **39. Only 20% of suicide attempts in gun owning households are with firearms, but 75% of their suicides are firearm suicides**

This paper combines six known "facts" about suicide (e.g., households with firearms are at approximately 3x the risk of suicide as households without firearms) to reach six estimates not currently available in the literature such as: gun-owning households account for about 90% of all firearm suicides; some 75% of their suicides are firearm suicides, but only 20% of their suicide attempts are with firearms. Among non-owning households, only 1% of their suicide attempts are with firearms, but firearms account for 10% of their suicides. The reasonableness of these results provides support for the reasonableness of the half-dozen known "facts" about firearms and suicide.

**Hemenway D.** Comparing gun-owning vs non-owning households in terms of firearm and non-firearm suicide and suicide attempts. *Preventive Medicine*. 2018

### **40. We helped create a decision-support tool for firearm storage to augment Lethal Means Counseling**

Firearm suicide is a major US problem. This article describes the creation of a tablet decision aid for suicidal adults to determine the most reasonable and acceptable method of firearm storage. Stakeholder interviews were used to develop the tool which can augment Lethal Means Counseling delivered by medical providers and others.

Betz M, Knoepke CE, Siry B, Clement A, **Azrael D**, Ernestus S, Matlock DD. "Lock to Live": development of a firearm storage decision aid to enhance lethal means counselling and prevent suicide. *Injury Prevention*. 2018 epub ahead of press.

## Homicide Followed by Suicide:

### **1. Most men who shoot and kill their intimate partners then kill themselves (Kentucky)**

We analyzed data from the Kentucky Firearm Injury Statistics Program for 1998-2000. While less than 7% of all firearm homicides were followed by a firearm suicide, in two-thirds of the cases in which a woman was shot in an intimate partner-related homicide, the male perpetrator then killed himself with the firearm. Few of these female victims had contact with the Department of Community-Based Services.

Walsh, Sabrina; **Hemenway, David**. Intimate partner violence: Homicides followed by suicides in Kentucky. *Journal of Kentucky Medical Association*. 2005; 103:667-70.

### **2. Most men who shoot and kill their intimate partners then kill themselves (many states)**

We analyzed characteristics of homicides that were followed by suicide and by suicide attempts using data from multiple sites. Fifty-nine percent of the men who killed a female intimate partner with a firearm also took their own life.

**Barber, Catherine W; Azrael, Deborah; Hemenway, David; Olson, Lenora M.;** Nie, C; Schaechter, Judy; Walsh, Sabrina. Suicides and suicide attempts following homicide: Victim-suspect relationship, weapon type, and presence of antidepressants. *Homicide Studies*. 2008; 12:285-97.

### **3. High rates of homicide followed by suicide in U.S. likely due to firearm access**

In a comparison of homicides-suicides in the Netherlands, Switzerland and the United States (using NVDRS data), major differences — e.g., Switzerland and the U.S. have much higher rates of homicide-suicide than the Netherlands — are explainable by the availability of firearms.

Liem, Marieke; **Barber, Catherine;** Markwalder, Nora; Killias, Martin; Nieuwbeerta, Paul. Homicide-suicide and other violent deaths: An international comparison. *Forensic Science International*. 2011; 207:70-76.

## Accidents:

### **1. Across states, more guns = more unintentional firearm deaths**

We analyzed data for 50 states over 19 years to investigate the relationship between gun prevalence and accidental gun deaths across different age groups. For every age group, where there were more guns, there were more accidental deaths. The mortality rate was 7 times higher in the four states with the most guns compared to the four states with the fewest guns.

**Miller, Matthew; Azrael, Deborah; Hemenway, David.** Firearm availability and unintentional firearm deaths. *Accident Analysis and Prevention*. 2001; 33:477-84.

### **2. Across states, unsafe gun storage = more unintentional firearm deaths**

We analyzed data from the 2002 Behavioral Risk Factor Surveillance System that asked questions about guns and gun storage in the home, combined with information on deaths from the National Center for Health Statistics. Across states, both firearm prevalence AND questionable storage practices (i.e. storing firearms loaded and unlocked) were associated with higher rates of unintentional firearm deaths.

**Miller, Matthew; Azrael, Deborah; Hemenway, David; Vrinotis, Mary.** Firearm storage practices and rates of unintentional firearm deaths in the United States. *Accident Analysis and Prevention*. 2005; 37:661-67.

### **3. Youth killed in gun accidents are shot by other youth**

The majority of people killed in firearm accidents are under age 24, and most of these young people are being shot by someone else, usually someone their own age. The shooter is typically a friend or family member, often an older brother. By contrast, older adults are at a far lower risk of accidental firearm death, and most often are shooting themselves. This article highlights one of the many benefits of the National Violent Death Reporting System (NVDRS). Before the NVDRS, data on the shooter in unintentional gun deaths was not readily available.

**Hemenway, David; Barber, Catherine; Miller, Matthew.** Unintentional firearm deaths: a comparison of other-inflicted and self-inflicted shootings. *Accident Analysis & Prevention*. 2010; 42:1184-8.

## Children:

### **1. Across states, more guns = more violent deaths to children**

We analyzed the relationship between firearm availability and unintentional gun death, homicide and suicide for 5-14 year olds across the 50 states over a ten-year period. Children in states with many guns have elevated rates of unintentional gun deaths, suicide and homicide. The state rates of non-firearm suicide and non-firearm homicide among children are not related to firearm availability.

**Miller, Matthew; Azrael, Deb; Hemenway, David.** Firearm availability and unintentional firearm deaths, suicide, and homicide among 5-14 year olds. *Journal of Trauma*. 2002; 52:267-75.

### **2. Child firearm suicide appears more impulsive than suicide by other means (Arizona)**

We analyzed data from the Arizona Childhood Fatality Review Team comparing youth gun suicide with suicide by other means. Children who used a firearm to commit suicide had fewer identifiable risk factors for suicide, such as expressing suicidal thoughts. Gun suicides appear more impulsive and spontaneous than suicide by other means.

**Azrael, Deborah; Hemenway, David; Miller, Matthew; Barber, Catherine;** Schackner, Robert. Youth suicide: Insights from 5 years of Arizona child review team data. *Suicide and Life Threatening Behavior*. 2004; 34:36-43.

### **3. Guns are rarely used in infant homicides**

This article used data from various locations to describe the circumstances of infant homicides. Guns were almost never used to kill infants. The perpetrator was virtually always caught, and often was the one calling the police.

**Fujiwara, Takeo; Barber, Catherine;** Schaechter, Judy; **Hemenway, David.** Characteristics of infant homicides in the U.S.: Findings from a multi-site reporting system. *Pediatrics*. 2009; 124:e210-17.

### **4. Parents incorrectly believe their children have not handled the family gun**

At family practice clinics in rural Alabama, over 400 parents were separated from their children, and both were asked questions about guns in the home. We found

that over 1/3 of parents who reported that their son had not handled a household gun were contradicted by the child.

**Baxley, Frances; Miller, Matthew.** Parental misperceptions about their children and firearms. *Annals of Pediatric and Adolescent Medicine.* 2006; 160:542-47.

### **5. Unsupervised firearm handling by adolescents often involves shooting the gun**

We analyzed data from a telephone survey of over 5,800 California adolescents conducted in 2000-01. We found that one-third of adolescents reported handling a firearm, 5% without adult supervision or knowledge. Smoking, drinking and parents not knowing the child's whereabouts in the afternoon were associated with unsupervised gun handling. These events usually occurred away from home, with friends. Half involved shooting the gun.

**Miller, Matthew; Hemenway, David.** Unsupervised firearm handling by California adolescents. *Injury Prevention.* 2004; 10:163-68.

### **6. Parents would not feel uncomfortable if asked by other parents if they have a gun**

We evaluated a year-long comprehensive, community-based campaign in a small Midwestern city that promoted the importance of parents asking adults in whose homes their children play or visit about household firearms and their safe storage. Attitudes and behavioral intentions changed modestly, but not significantly, in the expected direction. In addition, most parents believed that asking about firearms is a good idea and few would feel uncomfortable if another parent asked about firearms in their home. However, they overestimated the likelihood that asking about firearms would be offensive to other parents.

**Johnson, Rene M; Lintz, Jenny; Gross, Daniel, Miller, Matthew; Hemenway, David.** Evaluation of the ASK campaign in two Midwestern cities. *ISRN Public Health.* 2011 Dec 1;2012.

### **7. There are many sensible low-cost policies that could reduce child violent deaths**

The public health approach provides innovative ideas for protecting children from firearm injury.

**Hemenway, David.** Protecting children from firearm violence. *Big Ideas for Children: Investing in our Nation's Future.* 2008; 203-210.

## **8. While children are typically shot by other children, 2-4 years-olds usually shoot themselves**

Using data from the National Violent Death Reporting System for 16 states from 2005 to 2012, we estimate that there were 110 unintentional firearm deaths to children 0-14 annually in the U.S. during this 8 year time period, 80% higher than reported by the Vital Statistics. The large majority of children are shot by an adult who is not a family member.

While children are typically shot by other children, victims aged 2-4 are usually shooting themselves. While many boys aged 11-14 are shot unintentionally at a friend's house, this is not the case for girls and children aged 10 years and under.

**This article received the Jess Krauss award as the best article in *Injury Epidemiology* for the year 2015.**

**Hemenway, David**, Solnick SJ. Children and unintentional firearm death. *Injury Epidemiology*. 2015: 2:26-31.

## **9. Child perpetration of homicide can be classified into 5 categories**

Using data from the National Violent Death Reporting System, we examined homicides by children aged 0-14. Nearly 90% of the perpetrators were boys, over 90% were aged 11-14, and most used guns. We created five categories which accounted for over 70% of the events. These categories are: (1) the Caretaker, a juvenile, often an older brother, is given the responsibility of caring for an infant. The homicide typically occurs in the residence and blunt force is used (no guns); (2) Impulsive shooting during play, in which the child typically shoots a sibling or friend. Except for some notation of momentary anger, these cases look much like unintentional firearm fatalities; (3) Robbery, a group of youth are trying to steal money, usually from an adult; (4) Group assault, a group of youth are fighting, usually with other youth; (5) Killing an adult family member, typically a parent or grandparent. Creating a typology of events is useful both for understanding the problem and determining solutions.

**Hemenway, David**; Solnick, Sara J. The epidemiology of homicide perpetration by children. *Injury Epidemiology*. 2017; Dec 4(1): 5-

## **10. Commentary: Do home guns increase depression among adolescent girls?**

A large longitudinal cohort study of adolescents by Kim in *Social Science & Medicine* (2017) found that gaining easy access to a firearm in the home was associated with increased depression among girls and increased fear in schools. We discuss many relevant studies (e.g., a meta-analysis of 78 studies found that the mere presence of weapons increases aggressive thought, hostile appraisals and actual aggression). We conclude: “My hope is that Kim’s 2018 study of the psychological effects of gun ownership will be a seminal investigation, leading to increased interest in the psychological effects—both positive and negative—of firearms on all members of the household, as well as members of the surrounding community.”

**Hemenway, David.** Easy home gun access and adolescent depression. *Social Science & Medicine*. 2017; December 28 [Epub ahead of print]

Women:

**1. Across states, more guns = more female violent deaths**

We analyzed the relationship between firearm availability and unintentional gun death, homicide and suicide for women across the 50 states over a ten-year period. Women in states with many guns had elevated rates of unintentional gun deaths, suicides and homicides, particularly firearm suicides and firearm homicides.

**Miller, Matthew; Azrael, Deborah; Hemenway, David.** Firearm availability and unintentional firearm deaths, suicide, and homicide among women. *Journal of Urban Health.* 2002; 79:26-38.

**2. Across high-income countries, more guns = more female homicide deaths.**

We analyzed the relationship between gun availability and homicides of women with data from 25 high-income countries. Across developed nations, where gun are more available, there are more homicides of women. The United States has the most firearms and U.S. women are far more likely to be homicide victims than women in other developed countries.

**Hemenway, David; Shinoda-Tagawa, Tomoko; Miller, Matthew.** Firearm availability and female homicide victimization rates across 25 populous high-income countries. *Journal of the American Medical Women's Association.* 2002; 57:100-04.

## Gun Ownership:

### **1. Almost half of gun owners own four or more guns**

We analyzed a nationally representative household telephone survey of over 2,750 adults that we conducted in 2004. We found that 38% of households (45% of men and 11% of women) reported owning at least one firearm. Almost half (48%) of gun owners reported owning four or more guns with a few possessing large numbers of guns; 64% of gun owners owned at least one handgun. Gun ownership remains widespread, but a smaller percentage of gun owners possess an increasing percentage of the gun stock.

**Hepburn, Lisa; Miller, Matthew; Azrael, Deborah; Hemenway, David.** The US gun stock: Results from the 2004 national firearms survey. *Injury Prevention*. 2007; 13:15-19.

### **2. Owners of semi-automatic guns are more likely to binge drink than other gun owners**

We analyzed data from a national random-digit-dial telephone survey. Owners of semi-automatic weapons are more likely than other gun owners to be male, own a gun for protection, and report binge drinking.

**Hemenway, David; Richardson, Elizabeth.** Characteristics of automatic or semi-automatic firearm ownership. *American Journal of Public Health*. 1997; 87:286-88.

### **3-4. Gun ownership creates external psychic costs**

We analyzed whether perceptions of safety might be affected if more people in a community acquired firearms using data from a national random-digit-dial survey of adults conducted under the auspices of the Harvard Injury Control Research Center. By a margin of more than 3 to 1, Americans would feel less safe, not safer, as others in their community acquire guns. Among women, but not among men, those who have been threatened with a gun are particularly likely to feel less safe.

**Hemenway, David; Solnick, Sara J; Azrael, Deborah R.** Firearms and community feelings of safety. *Journal of Criminal Law and Criminology*. 1995; 86:121-132.

**Miller, Matthew; Azrael, Deborah; Hemenway, David.** Community firearms and community fear. *Epidemiology*. 2000; 11:709-714.

## **5. For over 20% of firearm acquisitions in the past two years, there was no background check**

Using data from a HICRC sponsored nationally representative survey of more than 1600 firearm owners, we estimate that 22% of gun owners who reported obtaining their most recent firearm in the previous two years reported doing so without a background check. For firearms purchased privately, 50% were obtained without a background check (with an even higher percentage for gun owners living in states that do not regulate private firearm sales). An accompanying editorial by Philip Cook of Duke University was entitled “At last, a good estimate of the magnitude of the private-sale loophole for firearms.”

**Miller, Matthew; Hepburn, Lisa; Azrael, Deborah.** Firearm acquisition without background checks: results for a national survey. *Annals of Internal Medicine*. 2017; 166(4): 232-39.

## **6. 22% of US adults are gun owners**

Using data from HICRC’s 2015 national survey, we estimate that 22% of US adults own guns. In other words, there are 3.5 times as many adults do not own guns as do own guns. We estimate there are approximately 265 million guns in the US, with the mean number of guns per owner of 4.8. One half of all guns in the US are owned by 3% of the US adult population. This article lays out a large number of facts about US gun ownership.

**Azrael, Deborah; Hepburn, Lisa; Hemenway, David; Miller, Matthew.** The stock and flow of US firearms: results from the 2015 National Firearms Survey. *The Russell Sage Foundation Journal of the Social Sciences*. 2017; 3(5):38-57.

## **7. Most veterans do not own firearms**

Using data from the HICRC sponsored National Firearms Survey, which oversampled US veterans, researchers provided detailed, nationally representative information on firearm ownership among US veterans. About 47% of male veterans and 24% of female veterans own firearms. Over 63% report that protection is a primary reason for firearm ownership.

Cleveland, Emily C; **Azrael, Deborah**; Simonetti, Joseph A. Firearm ownership among American veterans: findings from the 2015 National Firearm Survey *Injury Epidemiology*. 2017; 4(1) 33-

**8. About 1 million Americans become new gun owners each year.**

Using data from the HICRC sponsored National Firearms Survey, we examined differences between new and long-standing gun owners. New owners are younger, own fewer guns, are more likely to own guns solely for protection, but fortunately, are also more likely to store their guns safely.

**Wertz J, Azrael D, Hemenway D, Sorenson S, Miller M.** Differences between new and long-standing US gun owners: results from a national survey. *American Journal of Public Health* 2018 Online first.

## Training:

### **1. Basic firearm training classes rarely discuss important public health issues about firearms**

In the first study of its kind, volunteers audited twenty basic firearm classes in the Northeastern US. While most trainers cover many aspects of firearm safety, very few discuss important public health issues such as guns and suicide, gun theft as a major source of illegal guns, using guns in self-defense only as a last resort, techniques for de-escalating threats, or provide data on home invasions, gun accidents, sexual assaults or homicides. We believe that collaboration between public health experts and firearm trainers could lead to additional information being provided to trainees to increase firearm safety.

**Hemenway, David; Rausher, Steven;** Violano Pina; Raybould, Toby A; **Barber Catherine.** Firearms training: what is actually taught? *Injury Prevention.* 2017 Oct (Epub ahead of publication).

### **2. Among gun owners, nationally 61% have received formal firearms training**

HICRC's national survey of gun owners finds that 61% report having ever received formal firearms training. In the New England region, over 78% have received formal training. Gun owners in the three southern regions (South Atlantic, East South Central, West South Central) are least likely to have received formal training. The training content seems to vary widely. Only 15% of gun owners report receiving any information about suicide prevention.

Rowhani-Rahbar, Ali; Lyons, Vivian; Simonetti, Joseph A; **Azrael, Deborah; Miller, Matthew.** Formal firearm training among adults in the USA: results from a national survey. *Injury Prevention.* 2018; 24(2):161-165.

## Theft

### **1. The South accounts for 2/3 of all guns stolen in the US.**

In the HICRC survey of more than 1600 US gun owners (2015), 2.4% reported having a gun stolen in the past five years, with a mean of 1.5 guns lost per theft. This represents approximately 250,000 guns theft incidents annually with about 380,000 total guns stolen. Individuals who own many guns, who carry guns, and who do not store guns safety are at higher risk of having guns stolen. Of the four US regions, the South, which is home to 37% of US households, accounts for two-thirds of guns stolen. Although gun theft is a common way that guns get into criminal hands, this study appears to be the first journal article to focus on the epidemiology of gun theft from private citizens.

**Hemenway, David; Azrael, Deborah; Miller, Matthew.** Whose guns are stolen? The epidemiology of gun theft victims. *Injury Epidemiology*. December 2017; [Epub ahead of print]

## Gun Storage:

### **1-2. Gun training is not associated with appropriate gun storage**

We analyzed a number of national random-digit-dial telephone surveys. Many gun owners report storing their guns loaded and unlocked. Gun training is often associated with an increased likelihood of storing firearms in this manner.

**Weil, Douglas S; Hemenway, David.** Loaded guns in the home: An analysis of a national, random survey of gun owners. *JAMA*. 1992; 267:3033-37. See response: Weil DS, Hemenway D. Violence in America: Guns. *JAMA*. 1992; 268:307.

**Hemenway, David; Solnick, Sara J; Azrael Deborah R.** Firearm training and storage. *JAMA*. 1995; 273:46-50. See response: Hemenway D, Solnick SJ, Azrael DR. Firearms training. *JAMA*. 1995; 273:1733-34.

### **3. Women often incorrectly believe the gun is stored appropriately**

We analyzed gun storage practices from data obtained from a 1999 national random-digit-dial survey of adults conducted under the auspices of the Harvard Injury Control Research Center. Prior studies found that women appear to underreport household gun ownership. This study indicates that women, when they report a gun in the home, often incorrectly believe that it is stored unloaded and locked up.

**Azrael, Deborah; Miller, Matthew; Hemenway, David.** "Are firearms stored safely in households with children? It depends on whom you ask." *Pediatrics* electronic pages. 2000; 106: e31.

### **4. Too many parents store guns dangerously**

Some 400 parents with firearms in the home responded to questions about firearms storage. Over 20% of parents had a loaded firearm and 8% stored at least one firearm loaded and unlocked. Households with teenagers were somewhat more likely to store firearms unsafely.

**Johnson, Renee M; Miller, Matthew; Vriniotis, Mary; Azrael, Deborah; Hemenway, David.** "Are household firearms stored less safely in homes with adolescents?: Analysis of a national random sample of parents." *Archives of Pediatrics & Adolescent Medicine*. 2006; 160:788-92.

## **5. It is better to create a safe environment than to rely on educating children not to touch guns**

We summarized the literature on preventing child access to firearms.

**Johnson, Renee; Hemenway, David.** Prevention of children and youths' access to and operation of firearms: A review of interventions. Preventing access to and use of firearms. In: Trafton, Jodie A & Gordon, William P (eds). *Best Practices in the Behavioral Management of Health from Preconception to Adolescence, Vol III*. Institute for Brain Potential. 2008.

## **6. Gun owners store guns poorly even for children at risk for firearm suicide and accidents.**

Using data from the HICRC-sponsored National Firearms Survey of close to four thousands adults, HICRC researchers found that millions of US children live in homes where firearms are left loaded or unlocked or both. A child's history of depression or attention-deficit/hyperactivity disorder does not appreciably influence parental decisions about whether to have firearms in the home or to store the firearms safely.

**Scott, John; Azrael, Deborah; Miller, Matthew.** Firearm storage in homes with children with self-harm risk factors" *Pediatrics* 2018 epub ahead of publication

## **7-8. One third of Veterans store their guns loaded and unlocked**

Data from the HICRC 2015 National Firearm Survey show that 1 in 3 US Veteran firearm owners store a household firearm loaded and unlocked. Storage is similar among those with and without self-reported suicide risk factors. Veterans who own more guns, own guns for protection, and carry guns are more likely than others to store guns loaded and unlocked.

Simonetti J, **Azrael D, Miller M.** Firearm storage practices, risk perceptions, and planned suicide prevention actions among veteran gun owners with and without self-harm risk factors. *Suicide and Life Threatening Behavior*. In Press.

Simonetti J, **Azrael D, Rowhani-Rahbar A, Miller M.** Firearm storage practices among American veterans. *American Journal of Preventive Medicine*. 2018. Epub ahead of publication

## **9. Close to 5 million US children live in a home with a loaded and unlocked firearm**

Data from a nationally representative sample of US adults indicate that about 1/3 of households contain a firearm, and the in 20% at least one gun is stored loaded and unlocked. Hence about 7% of US children live in a home with firearms stored in the most unsafe manner.

**Azrael D**, Cohen J, Salhi C, **Miller M**. Firearm storage in gun-owning households with children: results of a 2015 national survey. *Journal of Urban Health*. 2018; 95:295-304.

## Physicians Gag Order

### **1. The Docs v Glocks Florida gag order pits the First and Second Amendments**

A NEJM Perspective on the case of *Wollschlaeger v. Governor of Florida* describes the issues at stake in the upcoming decision concerning a Florida law which regulates physician' speech concerning patients' gun ownership. The full court can "jeopardize physicians' ability to counsel patients about the importance of gun safety and potentially other important issues, or it can safeguard physicians' ability to speak truthfully to patients, without compromising the state's ability to regulate the practice of medicine."

Parmet, Wendy; Smith, Jason; **Miller, Matthew**. *Wollschlaeger v. Governor of Florida--The First Amendment, Physician Speech, and Firearm Safety*. *New England Journal of Medicine*. 2016; 374 (24) 2304-07.

### **2. Physicians are allowed to counsel patients about firearms; now they have to provide accurate scientific information.**

A NEJM Perspective describes the long-awaited US Court of Appeals for the Eleventh Circuit 10-1 decision that affirmed that the First Amendment applies to speech between doctors and patients. The court found no evidence "that routine questions to patients about the ownership of firearms are medically inappropriate, ethically problematic, or practically ineffective." "We expect doctors to doggedly exhort unhealthy patients to exercise more, eat less, or stop smoking, even when such admonishments may 'annoy persistently.'" A gun in the home substantially increases the risk of death to household members yet the majority of Americans are unaware of the heightened risk. Currently, most clinicians rarely if ever provide firearm-safety counseling. The Court ruled such counseling eminently legal. Now more physicians have to provide (scientifically based) advice about firearms.

Parmet, Wendy; Smith, Jason; **Miller, Matthew**. *Physicians, firearms, and free speech - overturning Florida's firearm-safety gag rule*. *New England Journal of Medicine*. 2017; 376(20); 1901-03.

## Guns at College:

### **1. Students with guns at college are more likely to misuse alcohol**

Using data from mailed surveys of over 10,000 undergraduates in 1997, we examined the prevalence of gun ownership. Approximately 3.5% of undergraduates reported having a working firearm at college. Students with guns were more likely to be male, white, live in a fraternity, live off-campus, binge drink, drive after drinking, and be injured severely enough to require medical attention. Students with guns at college are more likely to engage in alcohol-related behaviors that put themselves and others at risk of injury.

**Miller, Matthew; Hemenway, David;** Wechsler, Henry. Armed and dangerous? Guns at college. *Journal of American College Health*. 1999; 48:7-12.

### **2. At college, more guns = more gun threats**

Using data from mailed surveys of over 10,000 undergraduates in 2001, we examined correlates of gun possession at college. The 2001 survey confirmed the findings of the 1997 surveys, and also showed that guns on college campuses were more common in regions with higher levels of gun prevalence, and that gun threats to college students were also more common in these regions.

**Miller, Matthew; Hemenway, David;** Wechsler, Henry. Guns and gun threats at college. *Journal of American College Health*. 2002; 51:57-65.

## Gun Threats and Self-Defense Gun Use:

### **1-3. Guns are not used millions of times each year in self-defense**

We use epidemiological theory to explain why the “false positive” problem for rare events can lead to large overestimates of the incidence of rare diseases or rare phenomena such as self-defense gun use. We then try to validate the claims of many millions of annual self-defense uses against available evidence. We find that the claim of many millions of annual self-defense gun uses by American citizens is invalid.

**Hemenway, David.** Survey research and self-defense gun use: An explanation of extreme overestimates. *Journal of Criminal Law and Criminology*. 1997; 87:1430-1445.

**Hemenway, David.** The myth of millions of annual self-defense gun uses: A case study of survey overestimates of rare events. *Chance* (American Statistical Association). 1997; 10:6-10.

**Cook, Philip J; Ludwig, Jens; Hemenway, David.** The gun debate’s new mythical number: How many defensive uses per year? *Journal of Policy Analysis and Management*. 1997; 16:463-469.

### **4. Most purported self-defense gun uses are gun uses in escalating arguments, and are both socially undesirable and illegal**

We analyzed data from two national random-digit-dial surveys conducted under the auspices of the Harvard Injury Control Research Center. Criminal court judges who read the self-reported accounts of the purported self-defense gun use rated a majority as being illegal, even assuming that the respondent had a permit to own and to carry a gun, and that the respondent had described the event honestly from his own perspective.

**Hemenway, David; Miller, Matthew; Azrael, Deborah.** Gun use in the United States: Results from two national surveys. *Injury Prevention*. 2000; 6:263-267.

### **5. Firearms are used far more often to intimidate than in self-defense**

Using data from a national random-digit-dial telephone survey conducted under the direction of the Harvard Injury Control Center, we examined the extent and nature of offensive gun use. We found that firearms are used far more often to frighten and intimidate than they are used in self-defense. All reported cases of criminal gun use, as well as many of the so-called self-defense gun uses, appear to be socially undesirable.

**Hemenway, David; Azrael, Deborah.** The relative frequency of offensive and defensive gun use: Results of a national survey. *Violence and Victims*. 2000; 15:257-272.

## **6. Guns in the home are used more often to intimidate intimates than to thwart crime**

Using data from a national random-digit-dial telephone survey conducted under the direction of the Harvard Injury Control Research Center, we investigated how and when guns are used in the home. We found that guns in the home are used more often to frighten intimates than to thwart crime; other weapons are far more commonly used against intruders than are guns.

**Azrael, Deborah R; Hemenway, David.** In the safety of your own home: Results from a national survey of gun use at home. *Social Science and Medicine*. 2000; 50:285-91.

## **7. Adolescents are far more likely to be threatened with a gun than to use one in self-defense**

We analyzed data from a telephone survey of 5,800 California adolescents aged 12-17 years, which asked questions about gun threats against and self-defense gun use by these young people. We found that these young people were far more likely to be threatened with a gun than to use a gun in self-defense, and most of the reported self-defense gun uses were hostile interactions between armed adolescents. Males, smokers, binge drinkers, those who threatened others and whose parents were less likely to know their whereabouts were more likely both to be threatened with a gun and to use a gun in self-defense.

**Hemenway, David; Miller, Matthew.** Gun threats against and self-defense gun use by California adolescents. *Archives of Pediatrics and Adolescent Medicine*. 2004; 158:395-400.

## **8. Criminals who are shot are typically the victims of crime**

Using data from a survey of detainees in a Washington D.C. jail, we worked with a prison physician to investigate the circumstances of gunshot wounds to these criminals.

We found that one in four of these detainees had been wounded, in events that appear unrelated to their incarceration. Most were shot when they were victims

of robberies, assaults and crossfires. Virtually none report being wounded by a “law-abiding citizen.”

May, John P; **Hemenway, David**. Oen, Roger; Pitts, Khalid R. When criminals are shot: A survey of Washington DC jail detainees. *Medscape General Medicine*. 2000; June 28. www.medscape.com

### **9-10. Few criminals are shot by decent law-abiding citizens**

Using data from surveys of detainees in six jails from around the nation, we worked with a prison physician to determine whether criminals seek hospital medical care when they are shot. Criminals almost always go to the hospital when they are shot. To believe fully the claims of millions of self-defense gun uses each year would mean believing that decent law-abiding citizens shot hundreds of thousands of criminals. But the data from emergency departments belie this claim, unless hundreds of thousands of wounded criminals are afraid to seek medical care. But virtually all criminals who have been shot went to the hospital, and can describe in detail what happened there.

May, John P; **Hemenway, David**. Oen, Roger; Pitts, Khalid R. Medical Care Solicitation by Criminals with Gunshot Wound Injuries: A Survey of Washington DC Jail Detainees. *Journal of Trauma*. 2000; 48:130-132.

May, John P; **Hemenway, David**. Do Criminals Go to the Hospital When They are Shot? *Injury Prevention*. 2002; 8:236-238.

### **11. Self-defense gun use is rare and not more effective at preventing injury than other protective actions**

Victims use guns in less than 1% of contact crimes, and women never use guns to protect themselves against sexual assault (in more than 300 cases). Victims using a gun were no less likely to be injured after taking protective action than victims using other forms of protective action. Compared to other protective actions, the National Crime Victimization Surveys provide little evidence that self-defense gun use is uniquely beneficial in reducing the likelihood of injury or property loss.

This article helps provide accurate information concerning self-defense gun use. It shows that many of the claims about the benefits of gun ownership are largely myths.

**Hemenway D**, Solnick SJ. The epidemiology of self-defense gun use: Evidence from the National Crime Victimization Surveys 2007-2011. *Preventive Medicine*. 2015; 79: 22-27.

## Batterers:

### **1. Batterers use guns in a variety of ways to intimidate their victims**

We analyzed survey data collected from over 8,000 males enrolled in a certified batterer intervention program in Massachusetts, 1999-2003. Recent gun owners were 8 times more likely to have threatened their partners with a gun than non-gun owners. Four main types of gun threats against partners were (a) threatening to shoot them, (b) threatening to shoot a pet or person the victim cares about, (c) cleaning, holding or loading a gun during an argument, and (d) shooting a gun during an argument.

Rothman, Emily; **Hemenway, David; Miller, Matthew; Azrael, Deborah.** Batterers' use of guns to threaten intimate partners. *Journal of the American Medical Women's Association.* 2005; 60:62-68.

### **2. Batterers with guns are more dangerous than batterers without guns**

We analyzed survey data of over 4,500 men in Massachusetts batterers' intervention programs. Risk factors for having a gun included having gambling problems, having attempted murder, and having threatened a partner with a firearm.

Rothman, Emily F.; **Johnson, Renee M.; Hemenway, David.** Gun possession among a sample of Massachusetts batterer program enrollees. *Evaluation Review.* 2006; 30:283-95.

## Gun Carrying:

### **1-2. Adolescents carry guns for protection—against other adolescents carrying guns**

We surveyed 7th and 10th graders in inner city schools in Boston and Milwaukee. We found that almost a quarter of 7th grade boys had already carried a gun, illegally. The overwhelming reason for carrying was self-protection. While guns were easily acquired, the large majority of respondents, and even the majority of those who had already carried a gun, wanted to live in a society where it was impossible for teens to get guns.

**Hemenway, David;** Prothrow-Stith, Deborah, Bergstein, Jack M; **Ander, Roseanna;** Kennedy, Bruce. Gun carrying among adolescents. *Law and Contemporary Problems*. 1996; 59:39-53.

Bergstein, Jack M; **Hemenway, David;** Kennedy, Bruce; Quaday, Sher; **Ander, Roseanna.** Guns in young hands: A survey of urban teenagers' attitudes and behaviors related to handgun violence. *Journal of Trauma*. 1996; 41:794-798.

### **3. Students who are old in their class are more likely to carry guns illegally**

Using data from the Massachusetts Youth Risk Behavior survey, we analyzed risk factors for adolescent gun carrying. We found that a simple objective measure – whether a student is old for their grade – is an important predictor of gun carrying. This fact may help clinicians identify high-risk students and target prevention strategies.

**Hayes, D Neil; Hemenway, David.** Age-within-school-class and adolescent gun carrying. *Pediatrics* electronic pages. 1999; 103:e64.

### **4. Increased gun carrying reduces community feeling of safety**

This paper uses data from two national random-digit-dial surveys to examine public attitudes about gun carrying. By a margin of 5 to 1, Americans feel less safe rather than safer as more people in their community begin to carry guns. By margins of at least 9 to 1, Americans do not believe that regular citizens should be allowed to bring their guns into restaurants, college campuses, sports stadium, bars, hospitals or government buildings.

**Hemenway, David; Azrael, Deborah; Miller, Matthew.** U.S. national attitudes concerning gun carrying. *Injury Prevention*. 2001; 7:282-285.

## **5. Social disorder increases the likelihood of adolescent gun carrying**

We analyzed data from over 1,800 youth in Chicago examining risk factors for adolescent gun carrying. We found that aspects of the neighborhood (social disorder, safety, collective efficacy) were important predictors of illegal gun carrying by youth.

Molnar, Beth; **Miller, Matthew; Azrael, Deborah**; Buka Steven. Neighborhood predictors of concealed firearm carrying among children and adolescents. *Archives of Pediatric Adolescent Medicine*. 2004; 158:657-64.

## **6. Selling crack is associated with carrying guns**

We analyzed data from interviews of over 200 young men and women at the Rhode Island Correctional Institution. We found that selling crack was highly associated with gun carrying; using hard drugs was not. Findings provide further evidence of a crack-gun connection.

**Kacaneck, Deborah; Hemenway, David**. Gun carrying and drug selling among youth incarcerated men and women. *Journal of Urban Health*. 2006; 83:266-74.

## **7. Adolescents overestimate peer gun carrying and thus are more likely to carry themselves**

We analyzed data from a random survey conducted in 2008 of over 1,700 high school students in Boston. Over 5% of students reported carrying a gun, 9% of boys and 2% of girls. Students substantially overestimated the percentage of their peers who carried guns and the likelihood that a respondent carried a gun was strongly associated with his perception of the level of peer gun carrying.

**Hemenway, David; Vrinotis, Mary; Johnson, Rene M; Miller, Matthew; Azrael, Deborah**. Gun carrying by high school students in Boston, MA: Does overestimation of peer gun carrying matter? *Journal of Adolescence*. 2011; 34:997-1003

## **8. Without police discretion, many dangerous people obtain carry licenses**

This is the first study to examine when, in may-issue states, the police use discretion to refuse to issue a permit. Our survey of police chiefs in Massachusetts found that chiefs issued few discretionary denials – median 2 per year. Common reasons for denial were providing false information, a history of assault (e.g., IPV), a history of drug or alcohol abuse, or mental-health issues. Allowing such individuals to legally carry firearms will not enhance public safety.

Local police chiefs typically know more about the people in their community than does a national computer.

**Hemenway D**, Hicks JG. “May issue” gun carrying laws and police discretion: Some evidence from Massachusetts. *Journal of Public Health Policy*. 2015; 36:324-34.

## **9. More guns and weak gun laws lead to more illegal youth gun carrying**

Using data on high school students from the Youth Risk Behavior Survey for years 2007, 2009, and 2011, youth were more likely to carry guns in states with weak gun laws and many guns. Across states, strong gun laws are associated with a lower likelihood of youth gun carrying.

This article provides evidence on another of the society-level costs of weak gun laws and high levels of household gun ownership.

Xuan Z, **Hemenway D**. State gun law environment and youth gun carrying in the United States. *JAMA Pediatrics*. 2015; 11:1-9.

## **10. Approximately 9 million Americans carry loaded handguns monthly**

HICRC’s national firearm survey finds that 24% of handgun owners report carrying loaded handguns in the past 30 days. Handgun owners living in “shall issue” states were far more likely to report carrying than gun owners living in “may issue” states.

Rowhani-Rahbar, Ali; **Azrael, Deborah**; Lyons, Vivian; Simonetti, Joseph; **Miller, Matthew**. Loaded handgun carrying among US adults, 2015. *American Journal of Public Health* 2017; 107(12): 1930-36.

## **11. Few Americans want the concealed carry of firearms in public places.**

Using data from HICRC’s nationally representative on-line survey conducted in 2015, we find that fewer than 20% of respondents support gun carrying in schools, bars or sports stadiums. In no location, including restaurants, service settings, retail stores, college campuses, places of worship, and government buildings, did even a third of Americans support gun carrying. These views contrast sharply with the current trend in state legislatures to expand the locations where individuals can legally carry guns.

Wolfson, Julia; Teret, Stephen; **Azrael, Deborah**; **Miller, Matthew**. The article appears online in the *American Journal of Public Health*. 2017; 107:929-37.

## **12. Depressed adolescents are more likely to carry guns to school.**

Data from the HICRC surveys of Boston high school students show that adolescent depression is associated with carrying guns to school and that social connectedness—positive relationships between the youth and adults—appears to reduce the likelihood of school gun carrying.

Juan SC, **Hemenway D**. From depression to youth school gun carrying in America: Social connectedness may help break the link. *Cogent Social Science*. 2017 Apr 7;3(1):1314877.

## Road Rage:

### **1. Motorists with guns are more likely to act aggressively (Arizona)**

Using data from a telephone survey in Arizona, we examined the relationship between road rage and gun carrying in motor vehicles. We found that self-reported hostile actions (e.g., obscene gestures, cursing or shouting, aggressively tailgating) were more common among men, young adults, and individuals who carried a firearm in their car.

**Miller, Matthew; Azrael, Deborah; Hemenway, David;** Solop, Frederic I. Road rage in Arizona: Armed and dangerous? *Accident Analysis and Prevention*. 2002; 34:807-814.

### **2. Motorists with guns are more likely to engage in types of road rage (U.S.)**

Over 2,400 licensed drivers responded to questions about their own aggressive driving in a 2004 national random-digit-dial survey. We found that 17% of respondents admitted to making obscene or rude gestures in the past year, and another 9% admitted to aggressively following too closely. Males, young adults, binge drinkers, those ever arrested for a non-traffic violation, and motorists who had been in a vehicle in which there was a gun, were more likely to engage in such forms of road rage.

**Hemenway, David; Vrinotis, Mary; Miller, Matthew.** Is an armed society a polite society? Guns and road rage. *Accident Analysis and Prevention*. 2006; 38:687-95.

## Segregation:

### **1. Residential segregation appears to increase gun violence**

Various measures of residential segregation are strongly associated with fatal and non-fatal firearm assault in Massachusetts communities.

Krieger N, Feldman JM, Waterman PD, Chen JT, Coull BA, **Hemenway D**. Local residential segregation matters. *Journal of Urban Health*. 2017 Apr 1;94(2):244-58.

### **2. The higher the level of state-level racial segregation the higher the disparity in Black-White firearm homicide.**

This article examines Black and White firearm homicide rates in 32 states over a quarter century (1991-2015). Even after controlling for Black and White deprivation, racial segregation was strongly associated with higher levels of Black-White firearm homicide disparity.

Knopov A, Rothman EF, Cronin SW, Franklin L, Cansever A, Potter F, Mesic A, Sharma A, Xuan Z, Siegel M, **Hemenway D**. The role of racial residential segregation in Black-White disparities in firearm homicide at the state level in the United States, 1991-2015. *Journal of the National Medical Association*. 2018; epub ahead of print

## Other Countries:

### **1. In Jamaica, most gun homicides occur during disputes or are revenge killings**

We read the police narratives for every homicide in Jamaica, 1998-2002. The murder rate has been increasing steadily in Jamaica, and most of the murders are completed with firearms. The principal motives are disputes and revenge. Drugs, gangs, and political killings are no longer the main factors associated with murder.

**Lemard, Glendene; Hemenway, David.** Violence in Jamaica: An analysis of homicides 1998-2002. *Injury Prevention*. 2006; 12:15-18.

### **2. In Canada, most firearm deaths occur within 24 hours of the shooting**

Using data for all firearm-injured patients in the Canadian National Trauma Registry, we evaluated demographic and causal factors of injury. We found that about 40% of the shooting victims died in-hospital, with 83% of fatalities occurring on the first day. ISS score, first systolic blood pressure, first Glasgow Coma Scale score, male gender and self-inflicted injury were all predictors of in-hospital death.

Finley, Christian J; **Hemenway, David**; Clifton, Joanne; Brown D Ross; Simons, Richard K; Hameed S Morad. The demographics of significant firearm injury in Canadian trauma centres and the associated predictors of in-hospital mortality. *Canadian Journal of Surgery*. 2008; 51:197-203.

### **3. In Mexico as in the USA, more guns = more gun suicide; gun ownership levels are not related to non-gun suicide**

We assess the relationship between handgun prevalence and firearm suicide across the 32 states of Mexico for 2005. Where there were more handguns, there were more firearm suicides. There was no relationship between handgun prevalence and non-firearm suicides.

**Miller, Matthew**; Borges, Guilherme. Firearms and suicide in Mexico: Intimations of mortality. *Jovenes*. 2009; 32: 90-107.

### **4. Israel and Switzerland are not awash with firearms**

Gun advocates cite Switzerland and Israel as exemplars of nations with widespread gun ownership, permissive gun laws, and encouragement of armed

civilians who can deter and thwart shootings. These claims are evaluated with analysis of the International Crime Victimization Survey data and translation of laws and original source material. Compared with the United States, Switzerland and Israel have lower rates of gun ownership, stricter gun control laws, and their policies discourage gun ownership.

**Rosenbaum, Janet E.** Gun utopias? Firearm access and ownership in Israel and Switzerland. *Journal of Public Health Policy*. 2012; 33:46-58.

## **5. Few urban Mexican homes contain firearms**

Data from a 2017 household telephone survey of over 1,300 adults living in nine Mexican cities found that only 3% of homes contain firearms. Most individuals who report owning firearms possess only one gun, having purchased it recently for self-defense. Respondents were much more likely to believe that crime in Mexico would increase rather than decrease if guns were allowed in more places.

Esparza, David Perez and **Hemenway, David**. What is the level of household gun ownership in urban Mexico? An estimate from the first Mexican survey on gun ownership. *Injury Prevention*, 2017 (Epub ahead publication)

## Policy Evaluation:

### **1. “Shall issue” laws have no significant effect on the overall homicide rate**

We analyzed the effect on homicide of changes in state-level gun carrying laws using pooled cross-sectional time-series data for 50 states from 1979-1998. There was no statistically significant association between changes in concealed carry laws and state homicide rates. The finding was consistent across a variety of models.

**Hepburn, Lisa; Miller, Matthew; Azrael, Deborah; Hemenway, David.** The effect of nondiscretionary concealed weapon carrying laws on homicide. *Journal of Trauma*. 2004; 56:676-681.

### **2. Child access prevention laws may reduce unintentional child firearm fatalities**

We analyzed the effect on unintentional firearm fatalities to children of child access prevention (CAP) laws, which allow a firearm owner to be charged with a crime if a child gains access to an unsecured firearm, using pooled cross-sectional time series data for 50 states from 1979 to 2000. We found that states that enacted CAP laws – with felony rather than misdemeanor penalties – experienced greater subsequent declines in the rate of unintentional firearm deaths for children age 0 to 14 years, compared to states not enacting CAP laws.

**Hepburn, Lisa; Azrael, Deborah; Miller, Matthew; Hemenway, David.** The effect of child access prevention laws on unintentional child firearm fatalities, 1979-2000. *Journal of Trauma*. 2006; 61:423-28.

### **3. Some gun policy evaluations are designed to ensure that no effect will be found**

This article on statistics describes the limitations of studies that claim no effect of gun shows and no effect of the Australian gun buyback.

**Hemenway, David.** How to find nothing. *Journal of Public Health Policy*. 2009; 30:260-68.

### **4. Results of a flawed study results should not affect policy**

This paper highlights the serious flaws in a study that found no effect of gun shows on homicide or suicide.

Wintemute, Garen; **Hemenway, David**; Webster, Daniel; Pierce Glenn; Braga Anthony A. Gun shows and gun violence: Fatally flawed study. *American Journal of Public Health*. 2010;100;1856-60.

## **5. The Brady Bill has major limitations in scope, monitoring and enforcement**

One section of this chapter discusses the three aspects of regulation: the rules, monitoring of those rules, and punishments if the rules are not complied with. The Brady bill is discussed as an example of a law with major deficiencies in all three aspects.

**Hemenway, David**. Public policy. In: Guohua Li and Susan P. Baker, eds. *Injury Research: Theories, Methods and Approaches*. New York: Springer, 2012.

## **6. States with strong gun laws have lower rates of firearm homicide and firearm suicide**

We conducted a state-level ecological study for 2007-2010 and found that states with more firearm laws had lower rates of both gun homicide and gun suicide, even after controlling for race, poverty, unemployment, college education, population density, and non-firearm deaths.

Reviews by the Centers for Disease Control and the Institute of Medicine conclude that the evidence is not strong enough to determine whether or not firearm laws reduce lethal violence. This study provides evidence consistent with the hypothesis that firearm laws are effective in reducing homicide and suicide.

Fleegler EW, Lee LK, Monuteaux MC, **Hemenway D**, Mannix R. Firearm legislation and firearm-related fatalities in the United States. *JAMA-Internal Medicine*. 2013; 173:732-40.

## **7. Universal background checks could reduce firearm mortality**

An article by Kalesan et al finds that all gun control laws are associated with lower rates of firearm mortality—except Stand Your Ground laws, which are associated with higher rates. In a cross-sectional state analysis, universal background checks are most strongly associated with lower firearm mortality. In a Commentary, we discuss some limitations of the article, and that the large effect indicated for individual laws have to be taken with a grain of salt.

**Hemenway D**. *Firearm legislation and mortality in the USA*. The Lancet. 2016; 387:1796-97.

## **8. Stronger gun laws are associated with lower rates of firearm homicide**

Our literature review found that, in the US, stronger firearm laws were associated with lower rates of firearm homicide, even after adjusting for demographic and sociologic factors. There was evidence that specific laws such as universal background checks and permit-to-purchase requirements seemed to decrease firearm homicide rates.

Lee LK, Fleegler EW, Farrell C, Avakame E, Srinivasan S, **Hemenway D**, Monuteaux MC. Firearm laws and firearm homicides: a systematic review. *JAMA Internal Medicine*. 2017 Jan 1;177(1):106-19.

## **9. Crime guns flow from states with weak gun laws to states with strong gun laws**

In a state-level panel study 2006-16, we found that the percentage of guns traced to a dealer within that state was much higher for states with weak gun laws. Four laws independently associated with a lower percentage of in-state guns were permits of firearm purchase, a waiting period, prohibition of firearm possession by persons with a violent misdemeanor conviction, and a requirement to relinquish firearms when a person becomes disqualified.

Collins T, Greenberg R, Siegel M, Xuan Z, Rothman EF, Cronin SW, **Hemenway D**. State firearm laws and interstate transfer of guns in the United States, 2006-16. *Journal of Urban Health*. 2018.

## **10. Gun laws have differential effects on Black and White populations**

In a state-level panel study 1991-2016, we found that two laws (universal background checks and may issue laws) were associated with lower rates of firearm homicide for both Black and White populations, while having no relationship with non-firearm homicide. However, some laws seemed to have a differential effect between races. For example, domestic violence restraining orders and prohibition of purchase by individuals with violent misdemeanors were associated with reduced rates of Black but not White firearm homicide. The differential racial impact of firearm laws needs to be understood.

Knopov A, Rothman E, Cronin S, Xuan Z, Seigel M, **Hemenway D**. Impact of state firearm laws on homicide rates among the black and white populations in the United States, 1991-2016. *Journal of the National Medical Association*. In press.

## Public Health Approach:

### **1-5. The public health approach emphasizes prevention and focuses not only on the gun user but also the instrument of violence and the environment**

These articles summarize the public health problems caused by firearms, and the public health approach to reducing firearm injuries.

**Hemenway, David; Miller, Matthew.** Public health approach to the prevention of gun violence. *New England Journal of Medicine*. 2013; 368:2033-35.

**Hemenway, David.** "A public health approach to firearms policy" in Mechanic, David; Rogut, Lynn B; Colby, David C; Knickman, James R. eds. *Policy Challenges in Modern Health Care*. New Brunswick, NJ: Rutgers University Press, 2005. pp. 85-98.

**Hemenway, David.** The public health approach to reducing injury and violence. *Stanford Law and Policy Review*. 2006, 17:635-56.

**Hemenway D.** The public health approach to violence prevention. Voigt L, Harper DW, Thornton WE, Jr., eds. *Preventing Lethal Violence in New Orleans*. Lafayette, LA: University of Louisiana Press. 2015.

**Hemenway D.** Reducing firearm violence. *Crime and Justice*. Reinventing American Criminal Justice. 2017; 46:201-230.

This long article explains the public health approach to gun violence and describes ten policies that could substantially reduce the problem. The article appeared in an edited volume in one of the most widely read journals for criminologists.

### **6-7. We can learn from the successes in other public health arenas**

The public health approach to reduce the problems of motor vehicles, tobacco and alcohol is applied to firearms policy. Manufacturers try to focus prevention efforts on the user rather than the product. Public health efforts emphasize systematic data collection and a multi-faceted policy approach that includes modifying the product and the environment.

Mozaffarian, Dariush; **Hemenway, David;** Ludwig, David S. Curbing gun violence: Lessons from public health successes. *JAMA*. 2013; 309:551-52.

**Hemenway, David.** The public health approach to motor vehicles, tobacco, and alcohol, with applications to firearms policy. *Journal of Public Health Policy.* 2001; 22:381-402.

### **8. Many sensible policies can reduce our firearm problem**

A chapter in the book focuses on future success stories and includes a summary of policies aimed at reducing firearm injury.

**Hemenway, David.** Future Successes. In: *While We Were Sleeping: Success Stories in Injury and Violence Prevention.* University of California Press; May 2009.

### **9. Changing social norms is also an effective way to reduce firearm violence**

This viewpoint discusses social norms that could be changed to reduce suicide, gun trafficking, accidents and interpersonal violence, with examples of successes in norm changes from other fields.

**Hemenway, David.** Preventing gun violence by changing social norms. *JAMA-Internal Medicine.* 2013;173(13):1167-8.

### **10. Physicians should be allowed to ask their patients about firearm availability**

This commentary discusses the serious problems with the Florida law making it an offense for pediatricians and other doctors to discuss firearms with their patients under many circumstances.

Murtagh, Lindsey; **Miller, Matthew.** Censorship of the patient-physician relationship: A new Florida law. *JAMA.* 2011; 306:1131-32.

## Opinion Surveys:

### **1-2. The public favors most sensible gun policies, policies the U.S. does not have**

We analyzed surveys of the American public over time. Household gun ownership levels have been decreasing in the United States since the 1980s. Most adults, and even most gun owners, favor most gun control laws short of bans on gun ownership.

Blendon, Robert J; Young, John T; **Hemenway, David**. The American public and the gun control debate. *JAMA*. 1996; 275:1719-22.

Young, John T; **Hemenway, David**; Blendon, Robert J; Benson, John M. Poll. Trends: Guns. *Public Opinion Quarterly*. 1996; 60:634-649.

### **3. NRA members support many regulatory proposals**

We analyzed data from a national random-digit-dial telephone survey. National Rifle Association (NRA) members are similar to other gun owners in many respects, but they are more likely to own six or more guns. Unlike the NRA leadership, both NRA members and non-member gun owners support waiting periods and mandatory registration of handguns.

**Weil, Douglas S; Hemenway David**. I am the NRA: An analysis of a national random sample of gun owners. *Violence and Victims*. 1993; 8:353-65. See also Weil DS, Hemenway D. A response to Kleck (NRA). *Violence and Victims*. 1993; 8:377-85.

### **4. Most gun owners would purchase a childproof gun**

Using data from our National Firearms Survey, we find that among gun owners, over half of those who own handguns (55%) were willing to purchase a childproof gun. This suggests a substantial market exists for childproof guns among potential purchasers of new guns. This article contradicts the gun lobby assertion that there will not be a market for safer guns.

Wolfson JA, Teret SP, Frattaroli S, **Miller M, Azrael D**. The US public's preference for safer guns. *American Journal of Public Health*. 2016; 106: 411-413.

## **5. Most patients think it appropriate for physicians to discuss firearms with them**

Using data from our 2015 National Firearms Survey), we found that two-thirds of US adults think that it is at least sometimes appropriate for providers to talk to patients about firearms.

Betz ME, **Azrael D, Barber C, Miller M.** Public opinion regarding whether speaking with patients about firearms is appropriate: results of a national survey. *Annals of Internal Medicine.* 2016 Oct 18;165(8):543-50.

## **6. We find scientific consensus on many gun questions**

Monthly we surveyed firearm researchers and found that scientific consensus on many gun issues. Results of short polls show agreement that more guns and weak gun laws cause serious public health problems, that the costs of gun availability are typically greater than the benefits, and that stronger gun laws may improve public safety and health. 84% of researchers agreed and only 8% disagreed with the statement “in the United States, having a gun in the home increases the risk of suicide.” The surveys provide information about agreement or lack of agreement on specific issues and about the quality of the scientific evidence.

**Hemenway, David; Nolan, Elizabeth P.** The scientific agreement on firearm issues. *Injury Prevention.* 2017; 23(4):221-25.

## **7. Most Americans find it unacceptable to sell a gun to a stranger without a background check, independent of whether it is legal or not.**

One way that guns get into the wrong hands is via gun sales without a background check. Using data from a HICRC nationally representative on-line survey conducted in 2015, we find that 72% of American adults agree with the statement that “whether it is legal or not, it is NOT acceptable to sell a gun to a stranger without a background check”; 11% disagree. Subgroups less likely to agree are young adults, men, conservatives, those with less than a high school education, and gun owners. Still, most Americans, including 64% of gun owners believe that selling a gun to a stranger without a background check is unacceptable behavior.

**Hemenway, David; Azrael, Deborah; Miller, Matthew.** Selling a gun to a stranger without a background check: acceptable behavior? *Injury Prevention.* 2017 (Epub ahead of print).

## Surveillance and Data Quality:

### **1. The National Violent Death Reporting System (NVDRS) is already providing useful data**

This essay provides many specific examples of new knowledge available from the NVDRS, some of which has already informed policy.

**Barber, Catherine; Azrael, Deborah; Hemenway, David.** A truly national National Violent Death Reporting System. *Injury Prevention*. 2013; 19(4):225-6.

### **2. A good national data system for violent death is crucial**

A broadened reporting system, not only for firearms but for all violent deaths (all suicides and homicides) will provide more useful data, at only a small increased cost. This article summarizes the need for such a surveillance system, and its status as of 2001.

**Azrael, Deborah; Barber, Catherine;** Mercy, James. Linking data to save lives: Recent progress in establishing a National Violent Death Reporting System. *Harvard Health Policy Review*. 2001; 2:38-42.

### **3. A violent death reporting system will be useful for policy evaluation**

This article highlights the benefits of surveillance systems for various social issues (e.g., economics, crime, public health). It shows how the additional information provided by a national violent death reporting system can be used for policy evaluation.

**Azrael, Deborah; Barber, Catherine; Hemenway, David; Miller, Matthew.** "Data on violent injury." In: Jens Ludwig and Philip J. Cook, eds. *Evaluating Gun Policy: Effects on Crime and Violence*. Washington D.C.: Brookings Institution. 2003.

### **4. We describe the history of the creation of National Violent Death Reporting System**

We describe the effort of many groups, which led to the creation of this data system.

**Hemenway, David; Barber, Catherine W;** Gallagher, Susan S; **Azrael Deborah R.** Creating a national violent death reporting system: A successful beginning. *American Journal of Preventive Medicine*. 2009; 37:68-71.

## **5. The vital statistics underestimates other-inflicted gun accidents**

Do the vital statistics provide an accurate count of unintentional firearm deaths? We compared the Supplemental Homicide Report data on “manslaughter by negligence,” which are considered to be accidents with the vital statistics data. We found that only 23% of the negligence manslaughters were classified as accidents on the death certificates. Official vital statistics data almost certainly undercount firearm accident deaths when the victim is shot by another person.

**Barber, Catherine; Hemenway, David; Hochstadt, Jenny; Azrael, Deborah.** Underestimates of accidental firearm fatalities: Comparing Supplementary Homicide Report data with Vital Statistics. *Injury Prevention*. 2002; 8:252-256.

## **6. For accidental gun deaths, NVDRS data are accurate, Vital Statistics are not**

We carefully read all the circumstances of any death characterized as an unintentional firearm fatality by the state vital statistics registry (death certificate), the medical examiner or coroner, the police, or the National Violent Death Certificate (NVDRS) abstractor. We found that the NVDRS data were extremely accurate but the Vital Statistics data were not. The Vital Statistics data seriously under-report accidental deaths to children (many true accidents are reported as homicides) and over-report accidental deaths to adults (many homicides and suicides are reported as accidents).

**Barber, Catherine; Hemenway, David.** Too many or too few unintentional firearm deaths in official U.S. mortality data? *Accident Analysis and Prevention*. 2011; 43:724-31.

## **7. The best proxy measure of firearm prevalence is the percentage of suicides with guns**

Various proxy measures for the prevalence of firearm ownership were compared with surveys-based estimates. One proxy, the percentage of suicides with a firearm, performed consistently better than other measures in cross-sectional comparisons.

**Azrael, Deborah; Cook, Philip J; Miller, Matthew.** State and local prevalence of firearms ownership: Measurement, structure and trends. *Journal of Quantitative*

*Criminology*. 2004; 20:43-62. Also see National Bureau of Economic Research Working Paper #8570.

## **8. CDC's WISQARS dramatically underestimates the costs of street gun violence**

This commentary emphasizes that cost of injury estimates that focus on medical costs and productivity losses of the victims (e.g., WISQARS) dramatically underestimate the costs of street gun crime. Costs of street gun crime also include costs to the shooters family, criminal justice costs, trauma of witnesses, the costs of avoidance (e.g., children not being able to go out and play), the likelihood of retaliation, and the destruction of neighborhoods

**Hemenway, David.** Measuring the cost of injury: Underestimating the costs of street violence. *Injury Prevention*. 2011; 17(5):289-90.

## **9. Vital Statistics and police reports undercount homicides by police**

Homicides by police are vastly undercounted by police reports and by Vital Statistics. The National Violent Death Reporting System will be an excellent source for good data on police homicides but all states need to be part of the system.

Police killings are constantly in the news. This article provides another endorsement for the NVDRS, and shows that the U.S. doesn't need to create another data system for the sole purpose of tracking police homicide.

**Barber C, Azrael D, Cohen A, Miller M, Thymes D, Wang D, Hemenway D.** Homicides by police: Comparing counts from the National Violent Death Reporting System, Vital Statistics, and Supplementary Homicide Reports. *Journal of Public Health*. 2016; 106(5):922-7.

## **10. Good data systems are important**

This essay in a statistical journal highlights the importance of data **systems** (i.e., data collected consistently and comparably across sites and over time), provides examples of the need to recognize the current limitations of each system (e.g., NVDRS) along with the importance to keep improving them, and bemoans the lack of both data and funding for the analysis of firearm issues.

**Hemenway, David.** Firearms data and an ode to data systems. *Chance* (American Statistical Association) 2018 Feb; 31(1):7-11.

**11. There are data deficiencies and insufficient research in the firearms area.**

We argue that as anti-science sentiment sweeps the world, it is vital to stop the suppression of firearms studies. “The attempt to muzzle research requires constant push-back. I am always shocked to remember how recent the Enlightenment was, and how fragile is the freedom to be able to make careers out of the search for truth.”

**Hemenway, David.** Fighting the silencing of gun research. *Nature*. 2017; 546: 345-47.

Miscellaneous:

**1. An armed society is not a trusting society**

Working with experts on income inequality, social capital, and mortality, we analyzed the relationship between firearm availability and measures of social trust and civic engagement across U.S. states. We found that states with more guns have lower levels of both mutual trust and civic engagement, after accounting for urbanization, poverty and median household income.

**Hemenway, David;** Kennedy, Bruce; Kawachi, Ichiro; Putnam, Robert D. Firearm prevalence and social capital. *Annals of Epidemiology*. 2001; 11:484-490.

**2-3. Less lethal and less dangerous weapons need to be developed for civilians and for the police**

We made the case that more research needs to be done to make firearms safer, more effective, and less lethal.

**Hemenway, David; Weil, Douglas S.** Phasers on stun: The case for less lethal weapons. *Journal of Policy Analysis and Management*. 1990; 9:94-98.

**Hemenway, David; Weil, Douglas S.** Less lethal weapons. Op-Ed, Washington Post, May 14, 1990.

**4. An editorial for psychiatrists on ways society can reduce firearm violence**

This editorial, in a leading psychiatric journal (accompanied by a podcast by Drs. Matthew Miller and David Brent) makes the case that effective legislation, including universal background checks, is urgently needed, and could sustainably reduce our country's firearms death toll.

Lead author David Brent conducted many of the early case-control studies on the risk a gun in the home poses for adolescent suicide. It is important to have psychiatrists on board in the struggle to reduce firearm violence.

Brent D, **Miller M**, Loeber R, Mulvey E, Birmaher B. Ending the silence on gun violence. *Journal of the American Academy of Child and Adolescent Psychiatry*. 2013; 52:333-38.

## **5. More guns = more gun crime**

Across U.S. states, higher levels of firearm ownership are associated with higher levels of firearm assault, firearm robbery, firearm homicide and overall homicide. The findings do not support the hypothesis that higher population firearm ownership rates reduce firearm-associated criminal perpetration. On the contrary, evidence shows that states with higher levels of firearm ownership have an increased risk for violent crimes perpetrated with a firearm.

This article provides evidence that contradicts the common claim among gun advocates that gun ownership helps reduce crime.

Monuteaux MC, Lee LK, **Hemenway D**, Mannix R, Fleegler EW. Firearm ownership and violent crime in the U.S.: An ecological study. *American Journal of Preventive Medicine*. 2015; 49:207-14.

## **6. Many special laws protect gun manufacturers, dealers, owners and users**

A law article highlights the fact that although hundreds of thousands of guns are stolen each year, the US legal system is currently bankrupt of tools to deter dangerous, unreasonable firearms security. The current essay puts that fact into a broader perspective--that the treatment of gun owner negligence is just one example among many where there are special laws that often protect gun manufacturers, gun dealers, gun owners and gun users.

**Hemenway D**. Gun exceptionalism. *Florida Law Review Forum*. 2016; 68:45-50.

## **7. There is much firearms research that could help Emergency Medicine physicians**

A national panel of content experts for the American College of Emergency Physicians Research Committee decided on 59 emergency medicine-relevant empirical research questions that could help inform ED physicians in their work. .

Ranney ML, Fletcher J, Alter H, ...**Miller M**...et al. A consensus-driven agenda for emergency medicine firearm injury prevention research. *Annals of Emergency Medicine*. 2017 Feb 28;69(2):227-40.

## **8. We created an injury prevention class exercise focusing on preventing firearm violence**

This article describes a classroom exercises specifically designed for public health students interested in injury prevention. The suggested list-making exercise forces students to recognize and devise many policy and programmatic options over and above the ones that normally are discussed and evaluated. Most important, it helps give students a better understanding of what is meant by,

and the potential usefulness of, the public health approach to injury prevention. Examples all deal with preventing firearm injury.

**Hemenway D.** Injury prevention class exercise: three-pronged list making. *Injury Prevention*. 2018. Epub ahead of print.

Overall:

### **1. The United States has a very high rate of firearm death**

Using recent data from the World Health Organization (WHO), this paper provides striking evidence on the size of the U.S. problems of gun homicide, overall homicide, gun suicide, and unintentional gun death compared to other advanced countries — for both genders and every age group.

Richardson, Erin G; **Hemenway, David**. Homicide, suicide and unintentional firearm fatality: Comparing the United States with other high-income countries, 2003. *Journal of Trauma*. 2011; 70:238-43.

### **2. The risks of a gun in the home typically far outweigh the benefits**

This article summarizes the scientific literature on the health risks and benefits of having a gun in the home for the gun owner and his/her family and concludes that for most contemporary Americans, the health risk of a gun in the home is greater than the benefit.

**Hemenway, David**. Risks and benefits of a gun in the home. *American Journal of Lifestyle Medicine*. 2011; 5:502-511.

### **3. More guns, more violent death**

This book chapter summarizes the scientific literature on the relationship between levels of household gun ownership and violent death. It also shows that the majority of suicides for all age groups, and homicides for children and aging adults, occur at home.

**Miller, Matthew; Azrael, Deborah; Hemenway, David**. Firearms and violent death in the United States. In: Webster DW, Vernick JS, eds. Reducing Gun Violence in America. Baltimore MD: Johns Hopkins University Press, 2013.

### **4. Better mental health treatment may help but effective legislation is crucial to reduce gun violence**

This editorial, in a leading psychiatric journal makes the case that effective legislation, including universal background checks, is urgently needed, and could substantially reduce our country's firearms death toll.

Brent, David; **Miller, Matthew**; Loeber, Rolf; Mulvey, Edward P; Birmaher, Boris. Ending the silence on gun violence. *Journal of the American Academy of Child and Adolescent Psychiatry*. 2013; 52:333-38.

## **5. Per capita U.S. gun deaths vastly exceed all other high-income countries**

We examined 2010 mortality data obtained from the World Health Organization for populous, high-income countries (n = 23). U.S. homicide rates were 7 times higher than in other high-income countries, driven by a gun homicide rate that was over 25 times higher. The overall firearm death rate in the United States from all causes was 10 times higher. Ninety percent of women, 91% of children aged 0 to 14 years, 92% of youth aged 15 to 24 years, and 82% of all people killed by firearms in all these countries were from the United States.

This article updates and expands our previous, highly-cited article that provided the data showing how bad the U.S. is in terms of violent death --- particularly firearm death --- compared to the other advanced nations. It is virtually impossible to see these data and still claim that guns in the U.S. promote safety rather than death.

Grinshteyn E, **Hemenway D**. Violent death rates: The United States compares to other high-income OECD Countries. *American Journal of Medicine*. 2016; 129:266-73.