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Dear Friends and Colleagues,

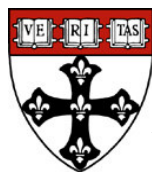
Some 30,000 Americans die each year in firearm-related injuries. We at the Harvard Injury Control Research Center are committed to doing research that informs prevention. But firearm injury is an incredibly broad area of research, crossing several disciplines and topical areas including policy, community practice, mental health, and others. It is a challenge to stay abreast of all the good research being conducted.

This marks the first issue of "Bullet Points: An Update on Firearms Research Provided by the Harvard Injury Control Research Center". Bullet Points represents our attempt to summarize the literature in firearm injury research in a fresh, readable way. Our aim with each issue is to examine one specific topic of firearm injury research in depth.

This issue reviews the evidence about whether safe firearm storage practices can prevent youth suicide. Because about a third of U.S. homes with children have guns, it is important to determine the protective value of encouraging those parents who have firearms to keep them stored unloaded and in a locked place.

We hope that you will enjoy this inaugural issue, and that it stimulates your work in preventing firearm injuries in the US and beyond!

David Hemenway, PhD
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Bullet Points

An update on firearms research provided by the Harvard Injury Control Research Center

Safe Firearm Storage Practices: What's the Evidence That They Can Prevent Adolescent Suicide?

Adolescent Firearm Suicide

Suicide is a significant public health problem among adolescents.^{1,2} In 2002, 1,289 young people aged 12-18 years died from suicide, making it the third leading cause of death for that age group. Nearly half of those deaths (599) involved a firearm.³ Reducing the number of firearm suicides, then, has the potential to substantially reduce the adolescent suicide rate overall.

Having a firearm in the home is an established risk factor for suicide among youth.⁴⁻¹⁰ In two studies about completed and attempted adolescent suicides, the majority of decedents obtained the firearms used to injure themselves from their own homes, or from the home of a friend or relative.^{9,11} A series of case-control studies conducted in the late 1980s and early 1990s showed that firearms were significantly more likely to be present in the homes of adolescent suicide victims than in the homes of controls.^{5-7,12} This information, paired with the fact that firearms are present in about one-third of all homes with children younger than 18 in the U.S.,¹³ indicates that young people have substantial access to a highly lethal means¹⁴ of suicide.

Firearm Storage Practices

To reduce youth access to household firearms, it is widely advised that parents who have firearms in the home store them in such a manner as to be inaccessible to young people. For example, the *American Academy of Pediatrics*¹⁵ and the *Society for Adolescent Medicine*¹⁶ recommend that parents keep household firearms stored unloaded and secured in a

locked place, such as a safe, lock box or gun cabinet. It is also recommended that ammunition be locked up and stored separately from firearms.

In U.S. households with young people, it is estimated that between 5% and 15% have at least one loaded firearm,¹⁷⁻¹⁹ 43% contain a firearm that is unlocked,¹⁸ and between 2% and 14% contain a firearm that is both loaded and unlocked.¹⁷⁻²⁰ (There is a paucity of information about ammunition storage practices.¹³) A recent study from the Centers for Disease Control and Prevention projected that more than 1.6 million children and adolescents live in homes with loaded and unlocked firearms.¹⁸

State-level estimates of the percentage of households with unsafely stored firearms are highest in the South and West regions of the U.S. Alabama (7.3%), Arkansas (6.6%), Alaska (6.6%), and Montana (6.4%) had the highest percentages of loaded and unlocked firearms among homes with children and adolescents. In six states, including Georgia, Mississippi, and the four states listed above, more than 10% of households with young people contained loaded firearms.¹⁸

Why would safe storage prevent adolescent suicides?

The best evidence indicates that suicidal individuals generally do not have a long-term, sustained will to die.²¹⁻²³ Therefore, restricting access to firearms, a highly lethal means of suicide¹⁴, is an important preventive strategy. Reducing access to household firearms through safe storage of firearms essentially forces attempters to "work harder" to attempt suicide, or makes it impossible for them to use a particular weapon. To illustrate, instead of simply

getting a loaded firearm from a parent's bedroom drawer, a young person would have to find the firearm and unlock it (if it were possible to unlock), find the ammunition and unlock it (again, if it were possible to unlock it), and then load the firearm. Because of the increased work involved in obtaining a weapon, many young people may not attempt suicide, or go on to use an alternative, and less lethal, means. Either way, many adolescent suicides could be prevented.

What is the scientific evidence?

There is growing evidence that safe storage practices are associated with a reduced risk of suicide.^{10,24} Brent and colleagues explored the effect of firearm storage on the risk of adolescent suicide in several case-control studies.⁴⁻⁸ Although findings were not statistically significant, crude comparisons indicated that adolescent suicide decedents had greater exposure to firearms stored unlocked, loaded, and/or with ammunition (**Table**).

Two more recent studies also suggest that safe storage practices are associated with a reduced risk for attempted or completed suicide.^{9,25} A study by Shah compared exposure to unlocked firearms among adolescent suicide decedents in Colorado, as compared to community control matched on demographic characteristics. Cases were more likely to have been exposed to unlocked firearms (58%) than controls (35%).

A case-control study recently published in *JAMA*

showed that firearms that were stored unloaded, or locked, were less likely to have been used in an attempted or completed adolescent suicide. In contrast to the other studies, these findings were strong and statistically significant.

All of the studies reviewed are limited geographically, and by small sample sizes. More research is needed to assess the protective effect of safe storage on adolescent suicide.

Promoting Safe Firearm Storage

The safest option is to remove firearms from the homes of adolescents. This is an extremely important recommendation for adolescents at high risk for suicide (e.g., being treated for depression). However, on a population-level, safe firearm storage practices are likely a preventive factor for suicide among young people. The growing evidence that safe storage can prevent adolescent suicide sets an important basis for continued efforts to encourage parents to keep firearms stored safely through counseling by health care professionals,²⁶⁻³¹ community-based health promotion^{32,33}; provision of extrinsic safety devices^{29,32,34}; and mass media campaigns³⁵⁻³⁷. In addition, safe storage practices may also prevent unintentional firearm injuries.²⁵

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Table. Case-Control Studies Assessing Firearm Storage Practices and Adolescent Suicide

<i>First Author, Year</i>	Shah, 2000 ⁹	Bukstein, 1993 ¹²	Brent, 1993 ⁴	Brent, 1993 ⁷	Brent, 1988 ⁶	Brent, 1991 ⁵	Grossman, 2005 ²⁵
<i>Setting</i>	1991-93, CO	1986-90, Western PA	1986-90, Western PA	1986-90, Western PA	1984-86, Western PA	1986-88, Western PA	1994-2001, Decedents from 37 counties in the states of WA, OR, MO. Nonfatal victims from Seattle, Tacoma and Spokane (WA), and Kansas City (MO).
<i>Cases (n)</i>	Adolescent suicide decedents (54)	Adolescent suicide decedents with diagnosis of substance abuse (23)	Adolescent suicide decedents with no psychopathology (Group 1: 7), and with psychopathology (Group 2: 60)	Adolescent suicide decedents (67)	Adolescent suicide decedents (27)	Adolescent suicide decedents (47)	Firearms involved in the suicide or suicide attempt of an adolescent (82)
<i>Controls (n)</i>	Community controls, matched by sex and age (36)	Community controls with diagnosis of substance abuse (12)	Community controls with no psychopathology (38)	Community controls matched by demographic characteristics (67)	Suicidal adolescents in an inpatient psychiatric clinic (50)	Adolescents who attempted suicide in an inpatient psychiatric clinic (Group 1: 47), and being treated at an outpatient psychiatric clinic (Group 2: 47)	Firearms identified from randomly selected households in the same counties (48)
<i>Exposure Variable</i>	Presence of an unlocked gun in the home	Presence of a loaded gun in the home	Presence of a loaded gun in the home	Presence of a loaded gun in the home	Graded measure of exposure, see footnote (A).	Graded measure of exposure, see footnote (B).	1) Gun stored unloaded, 2) Gun stored locked, 3) Ammunition locked, 4) Gun and ammunition stored separately
<i>Prevalence, Cases compared to controls</i>	58% vs. 35%	58% vs. 50%	42.9% (Group 1), 5.4% (Group 2), vs. 2.6%	9.5% vs. 4.8%	Not reported	X ² trend test was not statistically significant, trend in the direction of a greater proportion of completers with access to guns stored loaded or together with ammunition; 51.5%, vs. 23.5% (Group 1), 37.5% (Group 2)	Not reported
<i>Statistic</i>	OR – 2.57 95% CI – 0.98, 6.70	Not reported, indicated not to be statistically significant	Differences between both case groups and the control groups were statistically significant (<i>p</i> <0.01)	OR – 22.5 95% CI – 0.5, 12.9	Indicated differences were not statistically significant with a X ² trend test		<i>Unloaded:</i> OR – 0.39 95% CI – 0.19, 0.78 <i>Locked:</i> OR – 0.27 95% CI – 0.16, 0.47 <i>Ammunition locked:</i> OR – 0.40 95% CI – 0.22, 0.72 <i>Gun & ammunition stored separately:</i> OR – 0.56 95% CI – 0.32, 0.98

Abbreviations: OR – Odds Ratio, CI – Confidence Interval.

^A 1) loaded, 2) unloaded, unlocked, with ammunition, 3) unloaded, locked, with ammunition, 4) separate from ammunition, gun unlocked, ammunition unlocked, 5) separate from ammunition, one or both locked, 6) disassembled.

^B 1) gun stored loaded, unlocked, 2) gun and ammunition together, unlocked, 3) gun separate from ammunition, locked or unlocked, 4) gun locked, with or without ammunition.

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