

# Storage Practices of US Gun Owners in 2016

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**Objectives.** To examine gun storage practices and factors influencing those practices among gun owners.

**Methods.** We conducted a nationally representative online survey of US gun owners (n = 1444) in 2016 to assess gun storage practices and attitudes, factors influencing storage practices, and groups that might effectively communicate regarding safe storage. We generated descriptive statistics by using cross-tabulations and used logistic regression to estimate characteristics that influenced safe storage practices.

**Results.** Forty-six percent of gun owners reported safely storing all of their guns. Factors associated with higher odds of reporting safe storage were having a child in the home (adjusted odds ratio [AOR] = 1.44; 95% confidence interval [CI] = 1.03, 2.03), only owning handguns (AOR = 1.84; 95% CI = 1.24, 2.73), and reporting that storage decisions were influenced by a gun safety course (AOR = 2.05; 95% CI = 1.54, 2.74) or discussions with family members (AOR = 1.39; 95% CI = 1.05, 1.86). Gun owners ranked law enforcement, hunting or outdoors groups, active-duty military, and the National Rifle Association as most effective in communicating safe storage practices.

**Conclusions.** Public health campaigns to promote safe gun storage should consider partnering with groups that garner respect among gun owners for their experience with safe use of guns. (*Am J Public Health.* 2018;108:532–537. doi:10.2105/AJPH.2017.304262)

Household-level gun ownership is a strong determinant for gun injury,<sup>1,2</sup> and surveys indicate that approximately one third of US households have guns.<sup>3</sup> Households with a gun present are at increased risk for homicide, suicide, and unintentional shooting, especially households with youths.<sup>3–6</sup> Previous studies examining the presence of guns in households with children suggest that at least 1 gun is present in 35% to 40% of homes with children aged 18 years or younger.<sup>7,8</sup> Suicide was the second leading cause of death among youths aged 13 to 17 years in 2015; of the 1297 suicides in this age group, a firearm was used in 42% of fatalities.<sup>9</sup>

Safe gun storage refers to practices that limit accessibility to guns by unauthorized users<sup>3,10,11</sup> and has the potential to serve as a meaningful intervention to reduce gun-related injury.<sup>12–15</sup> Safe storage best practices include locking guns in a secure place such as a gun safe or cabinet or using safety devices such as trigger or cable locks, and these are supported by a variety of organizations.<sup>16–18</sup>

Various studies have demonstrated decreased risk for self-inflicted injury among adolescents when guns are stored in a safe manner.<sup>15,19–21</sup> Results were consistent across gun type (i.e., handgun or long gun) and injury intent (i.e., suicide attempts or unintentional injuries). In addition, states with child-access prevention laws that require guns to be stored in a safe manner have lower rates of adolescent gun suicide.<sup>22</sup>

Several researchers have attempted to ascertain rates of safe gun storage practices.<sup>23–28</sup> Previous research suggests that more than half of households store guns unlocked, loaded, or both.<sup>3,29</sup> Child age may<sup>30,31</sup> or may not<sup>8</sup> influence safe storage practices. Firearm training is not associated with safe storage

practices.<sup>24,25,32</sup> Compared with other racial and ethnic groups, non-Hispanic White households were more likely to store guns unlocked, loaded, or both.<sup>8</sup> However, many of these studies are more than 15 years old or have geographically restricted samples that limit generalizability of results.

In addition to providing a current national estimate of storage practices among US gun owners, this study adds to our understanding of what influences these practices and who might serve as the best messengers to ensure effective communication of safe gun storage.

## METHODS

We conducted 4 focus groups with a total of 16 Texas gun owners in January and February 2015 to better understand what types of storage practices gun owners engage in and what factors influence those practices. Recruitment occurred via flyers and word of mouth among gun owner groups in Texas. Two authors (C. K. C. and D. W. W.) conducted the focus groups, which lasted approximately 90 minutes. Participants received a \$50 gift card as compensation for their time. We did not assess participant knowledge about state gun storage laws; rather, focus groups focused on participants' reported gun storage practices and their attitudes about gun safety.

Audio recordings of the focus groups were professionally transcribed. One study author (M. L. D.) read the transcripts for data immersion and inductively created an initial codebook, and 2 authors (C. K. C. and M. L. D.) met to confer on the thematic meaning for all codes, resolving discrepancies through

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This article was accepted November 30, 2017.

doi: 10.2105/AJPH.2017.304262

consensus. Transcripts were then coded for themes relevant to gun storage. Focus group findings provided the basis for the development of the survey instrument used in this study as described in the next paragraphs.

## Survey Design and Data Collection

We conducted a nationally representative survey to examine US gun owners' gun storage practices. The survey research firm GfK Knowledge Networks (GfK) fielded the Internet-based survey between March 15 and April 13, 2016.

GfK has developed a probability-based panel of about 65 000 individuals from an address-based sampling frame that includes 97% of US households.<sup>33,34</sup> Individuals who agree to participate in the panel complete an initial demographic profile survey—including gun ownership status—and then respond to surveys via the Internet. On average, most GfK panelists participate in 2 surveys per month. Survey participation is encouraged through small cash rewards or gifts. For this survey, reminder e-mails were sent to nonrespondents every few days (total of 3 reminders) for the first 2 weeks that the survey was in the field. GfK has previously been used to conduct research related to guns and gun ownership.<sup>35–39</sup>

We fielded the survey with a random sample of GfK panelists aged 18 years or older who had self-reported personal gun ownership when completing their demographic profile. To ensure gun ownership status had not changed between entrance into the GfK panel and completion of this survey, we asked a screening question at the start of the survey to confirm that all survey respondents currently owned at least 1 gun. The completion rate—the proportion of GfK panelists who were randomly selected for our survey and completed it—was 67%. The sample size for the survey was 1444 gun owners.

## Measures

On the basis of findings from our focus groups, we designed a survey instrument with 38 questions about gun storage. The domains of the survey included the location(s) where respondents stored their guns at home, how their guns were stored, and how their ammunition was stored; what influenced their storage decisions and which of the identified

factors was most important; and their ratings of the potential messengers to communicate with gun owners about safe storage practices.

First, respondents were asked to report whether they stored “all guns,” “some guns,” or “no guns” in the following places: locked in a gun safe or cabinet; locked in a gun case; locked into a gun rack; other locked location; on my person; in my vehicle; in an unlocked location in my house; in an unlocked location in a building separate from my house such as a garage, barn, or other outbuilding; or other unlocked location. If respondents selected “all guns” or “some guns” to any unlocked location (excluding on my person), they were then asked if the gun(s) had a trigger lock or other lock. Second, respondents were asked to select “all guns,” “some guns,” or “no

guns” in response to descriptions of how guns could be stored: disassembled, assembled but unloaded, loaded but unchambered, or loaded and chambered. Third, respondents were asked where ammunition was stored: locked gun safe or other locked location; unlocked location, but physically separate from guns; or unlocked location, same physical location as guns.

Fourth, respondents were asked which of the following influenced the way(s) they store their gun(s) at home: a gun safety training course; military training; family discussions; discussions with friends, work colleagues, or other acquaintances; training at a firing range; online information; training from a family member; training from a friend, work colleague, or other acquaintance; social media; concerns about home defense; information

**TABLE 1—Home Gun Storage Practices Among a National Sample of Gun Owners (n = 1444): United States, 2016**

Storage Practice	No/No Guns, %	Yes/All Guns, %	Some Guns, %
<b>Where guns are stored</b>			
On my person	86	1	11
In a gun safe or cabinet	55	22	20
In a locked gun case	80	6	11
In a gun rack	89	13	7
In my vehicle			
Total	87	0	11
With trigger lock or other lock (n = 157)	52	23	15
In other locked location			
Total	86	5	7
With trigger lock or other lock (n = 159)	46	22	22
In any unlocked location in the house			
Total	53	24	21
With trigger lock or other lock (n = 689)	56	24	10
In any unlocked location separate from the house			
Total	92	1	5
With trigger lock or other lock (n = 76)	37	24	31
<b>How guns are stored</b>			
Disassembled	86	4	7
Assembled but unloaded	28	44	26
Loaded but unchambered	68	8	23
Loaded and chambered	75	7	16
<b>Where ammunition is stored</b>			
In a locked gun safe or other locked location	27	71	
Unlocked location, but physically separate from gun(s)	89	9	
Unlocked location, same physical location as gun(s)	90	7	

provided by gun shops or dealers; or none of the above. Respondents could choose as many of the options as was relevant for them. Next, a list containing each item to which the respondent said yes was presented and the respondent was asked to select the single response that has had the greatest influence over their storage decisions.

Finally, respondents were asked to rate which groups should teach gun owners about safe gun storage including family members; friends, coworkers, or other people you know well; casual acquaintances or someone you do not know well; hunting and outdoor organizations; hunting and outdoor magazines; the National Rifle Association (NRA); physicians; law enforcement officers; military veterans; active-duty military; celebrities; gun dealers; and gun show managers.

### Analytic Methods

We analyzed all results by using survey weights constructed by GfK to adjust the sample for known selection deviations and survey nonresponse so that the resulting design-weighted population was representative of the US population of gun owners.

We categorized respondents as using safe storage practices if all guns were stored in a locked gun safe, cabinet, or case; locked into a gun rack; or stored with a trigger lock or other lock. This definition is based on research evidence showing that these practices reduce the likelihood of unauthorized access or use.<sup>15,21</sup>

We used logistic regression to estimate which characteristics increased the odds of reporting safe storage practices for all guns. We chose covariates on the basis of previous literature exploring safe storage practices<sup>27,28,40,41</sup> and those available in the demographic profile. We included gender, whether a child was living in the home, whether only handguns were owned, number of guns owned, age, education, marital status, having served as active-duty military, income, race/ethnicity, region of the United States, and living in a metropolitan statistical area. Models also included measures of whether respondents reported that their storage practices were influenced by a gun safety training course, family discussions, or concerns about home defense because they

were the most commonly cited factors that influenced respondents' storage practices.

We conducted all analyses with the SVY command in Stata version 14.2 (StataCorp LP, College Station, TX).

### RESULTS

Table 1 presents respondents' gun storage practices. Very few gun owners reported storing all or some of their guns on their person or in their car when at home (12% and 11%, respectively). Twenty-four percent reported storing all of their guns in an unlocked location in the home; 24% of those who stored their guns in an unlocked location had a trigger lock on all of those guns. Twenty-two percent reported storing all their guns in a gun safe or cabinet and an additional 6% reported storing all their guns in a locked gun case. Forty-four percent reported storing all their guns assembled but unloaded. Seventy-one percent stored their ammunition locked in a gun safe or other locked location. An additional 9% stored their

**TABLE 3—Attitudes About Groups to Communicate Safe Storage Among a National Sample of Gun Owners (n = 1444): United States, 2016**

How Good or Poor Do You Think the Following Groups Would Be as Messengers to Teach Gun Owners About Safe Gun Storage?	Excellent or Good, %
Law enforcement	77
Hunting or outdoor organizations	73
Active duty military	73
Military veterans	72
National Rifle Association	71
Gun dealers	62
Family members	61
Hunting or outdoor magazines	61
Casual acquaintance	53
Friends or coworkers	52
Gun show managers	45
Physicians	19
Celebrities	11

ammunition in an unlocked location but physically separate from the gun(s).

Table 2 summarizes respondents' views about factors influencing their gun storage practices. The most common factors respondents selected were concerns about home defense (43%), a gun safety training course (35%), family discussions (30%), and gun safety training from a family member (27%). Thirty percent of respondents identified concerns about home defense as most strongly influencing their gun storage practices.

Table 3 presents attitudes about whether groups were viewed as effective communicators about safe gun storage practices. Those identified as most effective were law enforcement officers, hunting or outdoor groups, active-duty military personnel, and the NRA. Physicians and celebrities were the groups viewed as least effective in communicating to gun owners about safe storage practices.

Table 4 presents sociodemographic characteristics of the nationally representative study sample of US gun owners, which is comparable with the demographics of gun owners from the other most recent national survey.<sup>32,35</sup> Sixty-six percent were male, 60% were aged 45 years or older, and 22% had

**TABLE 2—Attitudes About Gun Storage Practices Among a National Sample of Gun Owners (n = 1444): United States, 2016**

Which of the Following Has Influenced the Way(s) You Store Your Guns at Home?	Influences Gun Storage, <sup>a</sup> %	Most Important, %
Concerns about home defense	43	30
Gun safety training course	35	18
Family discussions	30	15
Training from family member	27	12
Training at firing range	19	9
Military training	17	2
Discussions with friends, colleagues, or others	16	2
Training from friends, colleagues, or others	10	2
Information provided by gun shops or dealers	9	1
Online information	5	<1
Social media	4	<1
None of the above	18	7

<sup>a</sup>Respondents were directed to choose all responses that applied to them; therefore, results do not sum to 100.

**TABLE 4—Logistic Regression on Factors Associated With Safe Gun Storage Practices Among a National Sample of Gun Owners: United States, 2016**

Characteristic	%	Bivariable Analysis, OR (95% CI)	Multivariable Analysis, AOR (95% CI)
Any child in the home (aged < 18 y)	29	1.61 (1.22, 2.13)	1.44 (1.03, 2.03)
Own handgun(s) only	22	2.14 (1.58, 2.91)	1.84 (1.24, 2.73)
No. of guns (Ref = 1)	24		
2–4	41	0.62 (0.45, 0.85)	0.75 (0.51, 1.09)
≥ 5	35	0.38 (0.27, 0.54)	0.48 (0.31, 0.73)
Storage practices influenced by gun safety course	35	1.73 (1.33, 2.24)	2.05 (1.54, 2.74)
Storage practices influenced by family discussions	30	1.47 (1.12, 1.93)	1.39 (1.05, 1.86)
Storage practices influenced by concerns about home defense	43	0.75 (0.58, 0.96)	0.70 (0.53, 0.91)
Region (Ref = New England)	3		
Mid-Atlantic	10	0.67 (0.28, 1.60)	0.55 (0.23, 1.33)
East-North Central	14	0.56 (0.24, 1.28)	0.50 (0.22, 1.17)
West-North Central	9	0.66 (0.27, 1.57)	0.59 (0.24, 1.44)
South Atlantic	20	0.56 (0.24, 1.27)	0.45 (0.19, 1.04)
East-South Central	8	0.44 (0.18, 1.07)	0.36 (0.14, 0.89)
West-South Central	14	0.60 (0.27, 1.34)	0.50 (0.22, 1.15)
Mountain	9	0.66 (0.27, 1.60)	0.58 (0.23, 1.44)
Pacific	13	0.89 (0.38, 2.08)	0.91 (0.39, 2.17)
Age category, y (Ref = 18–29)	15		
30–44	25	1.09 (0.70, 1.70)	1.10 (0.78, 1.78)
45–59	29	1.02 (0.67, 1.55)	1.36 (0.83, 2.24)
≥ 60	31	0.64 (0.42, 0.97)	0.95 (0.56, 1.61)
Education category (Ref = < high school)	11		
High school	31	1.41 (0.84, 2.37)	1.45 (0.82, 2.55)
Some college	31	1.37 (0.82, 2.28)	1.18 (0.67, 2.07)
Bachelor's degree or higher	27	1.68 (1.00, 2.80)	1.49 (0.83, 2.70)
Marital status (Ref = married)	65		
Widowed	5	0.84 (0.45, 1.57)	1.14 (0.59, 2.20)
Divorced	10	0.93 (0.61, 1.41)	1.11 (0.70, 1.76)
Separated	1	0.87 (0.26, 3.00)	0.79 (0.21, 3.05)
Never married	14	1.03 (0.70, 2.48)	1.22 (0.76, 1.93)
Living with partner	5	1.34 (0.72, 2.48)	1.33 (0.65, 2.71)
Income category, \$ (Ref = < 50 000)	32		
50 000–99 999	38	1.16 (0.86, 1.57)	1.13 (0.80, 1.59)
≥ 100 000	30	1.21 (0.88, 1.66)	1.11 (0.75, 1.65)
Race/ethnicity (Ref = non-Hispanic White)	76		
Non-Hispanic Black	7	1.08 (0.62, 1.86)	1.06 (0.56, 1.99)
Hispanic	12	0.95 (0.61, 1.49)	0.89 (0.54, 1.46)
Non-Hispanic other	4	1.06 (0.46, 2.40)	0.76 (0.33, 1.77)
≥ 2 races	1	1.11 (0.57, 2.16)	1.00 (0.50, 2.01)
Female	34	1.60 (1.22, 2.08)	1.26 (0.94, 1.71)
Living in metropolitan statistical area	77	1.00 (0.74, 1.34)	0.82 (0.58, 1.14)
Served as active-duty military	22	0.61 (0.45, 0.83)	0.83 (0.60, 1.16)

Notes. AOR = adjusted odds ratio; CI = confidence interval; OR = odds ratio.

served as active-duty military. Non-Hispanic Whites made up 76% of the sample, 65% were married, and 58% had attended or completed college. Children younger than 18 years were present in 34% of the homes of gun owners. Thirty-five percent of gun owners surveyed reported owning more than 5 guns, and 22% owned only handguns. Forty-six percent reported safe storage practices for all of their guns.

Table 4 also presents the bivariate and multivariable results on factors influencing safe gun storage. When we controlled for sociodemographic factors, having at least 1 child in the home younger than 18 years, owning only handguns, and reporting that storage practices were influenced by a gun safety training course or family discussions each significantly increased the odds that respondents stored all of their guns safely. Reporting concerns about home defense, owning 5 or more guns, and living in the East-South Central region of the United States significantly decreased odds of a respondent storing all guns safely.

## DISCUSSION

This study provides updated estimates of safe storage practices and exploration of factors that influence these practices among US gun owners. Nearly half of gun owners reported using some sort of safe storage practice for all of their guns, including storing all of their guns in a locked gun safe, cabinet, or case; locked into a gun rack; or with a trigger lock. Safe storage practices were higher among individuals with children in the home, those that only owned handguns, and those who reported that their storage practices were influenced by a gun safety training course or family discussions. Given the strong evidence base on the benefits of safe gun storage, it is important to consider how to effectively promote safe storage practices among the more than 50% of gun owners who do not currently store all of their guns safely.

Several factors appear to drive storage practices and offer directions for future efforts to promote safe gun storage. Reporting that storage practices were influenced by a gun safety training course significantly increased the odds of reporting safe storage practices for all guns in our study. It is important to note

that we did not ask respondents whether they had taken a gun safety training course. As a result, we do not know how many within the sample had taken a course to add context to the number who reported that a course influenced their storage practices. However, 35% of respondents reported that their storage practices were influenced by a gun safety training course, which is a not insubstantial number of gun owners. It is possible that these respondents received training that specifically focused on storage, were already engaged in safe storage practices that were reinforced in a training class, or were motivated to change their storage behaviors. Several states require gun owners to take safety training courses. For example, first-time prospective handgun purchasers in Maryland are required to obtain a Handgun Qualification License; individuals applying for the license who do not currently have a handgun registered in their name must take a 4-hour safety course. This course covers the laws around gun ownership and safe gun handling and storage including an overview of Maryland's child-access prevention law. Texas gun owners who participated in focus groups expressed a strong sense of responsibility for gun safety. Encouraging or requiring gun owners to take safety courses that focus specifically on best practices for gun storage could improve safe storage.

Study findings suggest that gun owners perceive law enforcement, hunting or outdoor organizations, active-duty military, and the NRA as the most credible groups to communicate about safe storage practices with gun owners. Although states may have laws that require safe storage, gun storage practices are difficult to observe, making laws difficult to enforce unless a tragedy occurs that reveals unsafe practices. The difficulty of motivating safe storage via regulation heightens the importance of persuasive communication and education efforts as a means of motivating safety-oriented behavior change. Public health efforts to promote safe storage practices would likely benefit from engaging with local law enforcement agencies. Respondents also viewed the NRA as an effective messenger for communicating safe storage messages to gun owners. Most, if not all, instructors for safety training courses are certified by the NRA, and the NRA has a long history of focusing on safe

gun handling and storage. Engaging with the NRA to emphasize the importance of safe storage during training courses could improve storage practices among gun owners.

Our findings indicate that physicians are seen as poor messengers about safe storage practices by gun owners. This is consistent with previous research showing that, although some patients may find it acceptable for physicians to ask about guns, many feel that physicians lack an understanding of gun safety or gun culture.<sup>42,43</sup> As physicians interact regularly with gun owners about a range of health issues and are a respected professional group, they have the potential to serve as an important point of intervention on gun safety in their communities. However, if gun owners perceive physicians as having little experience with guns or gun ownership, it limits their capacity as credible messengers about safe storage practices. Physicians and other health professionals likely have more credibility discussing the need for safe gun storage, framing gun safety in the context of child and adolescent risk taking and suicidal ideation.<sup>44,45</sup>

Likewise, although celebrities may have positively contributed on other public health topics by which they have been personally affected (e.g., HIV,<sup>46,47</sup> breast cancer<sup>48,49</sup>), our results suggest that gun owners might not be as receptive to safe storage educational efforts by celebrities. However, this may depend on the specific celebrity identified as the messenger. Although Hollywood tends to be viewed as left-leaning and thus less appealing to gun owners generally, there may be specific individual celebrities who own guns and can garner respect among gun owners who could be persuasive spokespeople for gun safety communication efforts.

### Limitations

The results of this study should be considered in the context of some limitations. First, we did not consider whether the respondents lived in states with laws requiring safe storage, a factor that could likely influence gun storage practices. Second, online surveys could be vulnerable to sampling biases. GfK attempts to minimize this threat through probability-based sampling of households. Invitations to participate in the survey did not include the topic, reducing the likelihood that survey

participation was influenced by respondents' interests or views about guns.

### Conclusions

Although nearly half of gun owners in the United States currently use safe storage practices for all of their guns, additional efforts are needed to improve gun safety at home among the other half of the gun-owning public. Gun safety courses that teach gun owners about safe handling and storage may provide public health benefits by improving safe storage practices. Public health efforts to improve gun safety should consider partnering on communication and educational efforts with groups that are respected by gun owners for their knowledge and experience with safe use of guns such as law enforcement, military personnel, the NRA, and hunting and outdoor groups. **AJPH**

### CONTRIBUTORS

All authors made substantial contributions to the design of the study or the analysis and interpretation of the data, as well as the drafting and revision of the article. All authors approved the final version for publication.

### ACKNOWLEDGMENTS

This study was funded through a grant from The Simmons Foundation to the Johns Hopkins Center for Gun Policy and Research.

### HUMAN PARTICIPANT PROTECTION

This study was reviewed and approved by the Johns Hopkins Bloomberg School of Public Health institutional review board.

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