

Are Household Firearms Stored Less Safely in Homes With Adolescents?

Analysis of a National Random Sample of Parents

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Objective: To examine whether firearms are more frequently stored loaded, unlocked, or both in households with adolescents only (aged 13-17 years) compared with households with younger children only (aged 0-12 years).

Design: Random-digit-dial survey on firearms (n=2770). We computed bivariate associations between the presence of adolescents and firearm storage practices. Statistical significance was assessed using prevalence ratios with 95% confidence intervals.

Setting: United States.

Participants: Survey respondents with children (aged <18 years) who reported the presence of a household firearm.

Main Outcome Measures: Prevalence of firearms in the home stored loaded and/or unlocked.

Results: Of the 392 respondents, 22% had a loaded firearm, 32% had an unlocked firearm, and 8% had a firearm stored loaded and unlocked. Compared with households with younger children, households with adolescents only were somewhat more likely to store a firearm unlocked (42% vs 29%; prevalence ratio, 1.48; 95% confidence interval, 1.04-2.02), loaded (26% vs 20%; prevalence ratio, 1.25; 95% confidence interval, 0.82-1.91), or both (10% vs 8%; prevalence ratio, 1.43; 95% confidence interval, 0.64-3.19).

Conclusions: Parents of adolescents appear to be more likely to keep household firearms stored unsafely, especially with regard to keeping firearms unlocked. This is of concern because most youth firearm injuries happen to adolescents. Firearm injury prevention programs should directly target parents of adolescents to promote safe firearm storage.

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FIREARMS ARE PRESENT IN about one third of US households with children and youth.¹⁻⁴ Therefore, safe firearm storage practices—including keeping firearms stored unloaded and locked up—represent important safety behaviors. Research suggests that safe storage may confer a degree of protection in the risks for suicide and unintentional injury.⁵⁻⁸ In keeping with these findings, professional organizations, including the American Academy of Pediatrics⁹ and the Society for Adolescent Medicine,¹⁰ recommend that parents keep firearms stored unloaded and locked up.

In the United States, 14% to 30% of households with guns and young or adolescent children (aged <18 years) have at least 1 loaded firearm, and about 43% contain an unlocked firearm.^{1,3,4,11,12} A recent study¹³ estimated that nearly 2 million US children live in homes with loaded, unlocked firearms. The home is the pri-

mary place from which young people obtain firearms that are used in unintentional and violent injuries, as well as a primary setting in which pediatric firearm injuries, especially suicides, take place.^{7,8,14-16}

Keeping children and youth safe represents a strong motivation for parents to not have firearms in the home or to store them locked up and unloaded.^{2-4,17,18} However, parents' perceptions of how likely their children are to get hurt with a firearm may vary based on characteristics of the child. Qualitative research shows that parents' expectations that their children will not play with or touch guns are based on beliefs about their children having the wherewithal to act responsibly.¹⁸ When asked whether their children would handle firearms, parents who disagreed said things such as "My child knows better" or "has common sense."¹⁸ In the same vein, parents are more apt to believe that older children are old enough to act responsibly and use good judgment when there are fire-

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arms in the home¹⁸⁻²⁰; parents may therefore be less likely to use safe firearm storage practices when the only young people in the home are adolescents.^{3,4,18-20}

A few studies have explored how firearm storage practices vary by the age of the children in the home; their results suggest that parents of adolescents have less safe firearm storage practices than parents of younger children.^{3,4,18} In 1 national random-digit-dial study, authors found that, among gun owners with children (n=252), those with children younger than 13 years were less likely than those with adolescent children to store at least 1 gun loaded and unlocked (6% vs 17%; $P < .01$).³ Similarly, a separate national study showed that parents whose youngest children were aged 13 to 17 years were significantly more likely to report the presence of a firearm that was stored loaded and unlocked than parents who had children younger than 13 years.⁴ Unfortunately, neither study examined these 2 firearm storage practices individually. A third study, which was based on a sample of parents of children aged 5 to 15 years in northeastern Ohio, showed that parents with at least 1 child aged 5 to 9 years were significantly less likely than those whose children were all aged 10 to 15 years to have a firearm stored loaded and unlocked (12% vs 30%; $P = .046$).¹⁸

Additional research is needed to confirm how parents' firearm storage practices vary on the basis of the ages of children in the home. The purpose of this study was to examine the prevalence of having a firearm in the home that is loaded, unlocked, or both among a national sample of parents with children 17 years or younger. On the basis of findings from previous studies, we expected that parents of adolescents (aged 13-17 years) would be more likely to have a loaded and/or unlocked firearm in the home than those with younger children (aged 0-12 years).

METHODS

Data for this investigation come from the National Firearms Study 2004, a telephone survey in which adults (aged ≥ 18 years) in the United States were randomly selected for participation from a list-assisted sampling frame.²¹ Those who were unable to complete an interview in English were excluded. Data collection was performed by Fact Finders Inc, a social science research firm in Albany, NY. The number of interviews designated for each state was determined by that state's population relative to the total population of the United States. In multi-adult households, 1 adult was randomly selected to take part in the study.

Of the 31 302 telephone numbers called for the study, 91.1% did not result in an interview. Of these, 41.4% were ineligible numbers (eg, nonresidential, line out of service, quota reached for the particular state). For an additional 39.2%, an interview did not take place after the maximum number of calls (ie, 10) had been made for 1 of the following reasons: only an answering machine picked up, the line was always busy, the line was never answered, or the potential respondent was never available. Only 19.0%^{5,21} of the numbers called that did not result in an interview were refusals. The total National Firearms Study 2004 sample included 2770 adults.

The instrument included some 100 items and was designed to be completed in approximately 15 minutes. A verbal informed consent procedure was conducted before beginning the interview. Items inquired about included attitudes and be-

liefs regarding firearms, firearm ownership and storage practices, and demographic characteristics of the respondent and members of the household. To inquire about firearm ownership, we asked the following question: "Do you have any guns in your home or motor vehicle?" We then asked about how those firearms were stored (eg, "How many of those guns are currently loaded?"). Data were collected in the spring of 2004 using computer-assisted telephone interviewing technology.²²⁻²⁴ The study was approved by the Institutional Review Board at the Harvard School of Public Health, Boston, Mass.

For this investigation, the National Firearms Study 2004 sample was restricted to the 405 respondents who had at least 1 child younger than 18 years living with them and who also indicated that there was a firearm in the home. Thirteen of the 405 eligible respondents were excluded because they had not provided information on the ages of children in their households, leaving a total number of respondents in the analysis sample of 392. Descriptive statistics were generated for demographic characteristics, firearm storage practices (presence of any firearm in the home that was loaded, unlocked, or both), and ages of the children (<5, 5-12, and 13-17 years). We calculated cross-tabulated frequency distributions to examine the relationship between the ages of the children in the home and firearm storage practices. Next, we compared the prevalence of an unsafe firearm storage practice (storing a firearm loaded, unlocked, or both) in homes in which all of the children were aged 13 to 17 years with that in homes in which all of the children were younger than 13 years. We excluded households that contained children in both age groups from this analysis. We tested the statistical significance of the associations by estimating prevalence ratios (PRs) with 95% confidence intervals.^{25,26} Analyses were conducted using SAS statistical software, version 9.1.2.²⁷

RESULTS

Of the 392 respondents in the analysis sample, 58.7% were male, 78.5% were married, 66.5% were aged 30 to 49 years, and 87.1% were white. By design, all respondents in the study sample had firearms in the home and children younger than 18 years. Ages of children ranged from a few weeks to 17 years. Nearly half (47.7%) had at least 1 teenager in the home. For 110 (28.1%) of the 392 respondents, all of the children in the home were aged 13 to 17 years (**Table 1**).

The number of guns respondents had in their homes ranged from 1 to 70; more than three quarters (78.1%) reported having more than 1 gun. Of the respondents, 70.8% indicated that they personally owned at least 1 of the household firearms, and 64.9% reported the presence of a handgun. In terms of storage practices, 21.7% had a loaded gun, 31.5% had an unlocked gun, and 8.3% had a gun that was loaded and unlocked (**Table 2**).

Respondents whose children were all aged 13 to 17 years had the highest prevalence of unsafe firearm storage practices (**Figure**). Whereas 28.8% of parents whose children were all 12 years or younger had an unlocked firearm in the home, 41.7% of parents whose children were all aged 13 to 17 years did (PR, 1.48; 95% confidence interval, 1.04-2.02). Although not statistically significant at the .05 level, the PRs suggest that having a teenager as opposed to a younger child is associated with an increased likelihood of having a household firearm stored loaded (PR, 1.25) or loaded and unlocked (PR, 1.43) (Table 2).

Previous research suggests that parents with children older than 12 years may be more likely to store firearms unsafely than those with younger children.^{3,4,18} We tested those findings by investigating whether parents of adolescents were more likely to have firearms stored unsafely. Our results were consistent with those of previous research. We found that parents of adolescents were significantly more likely than parents of children 12 years or younger to have an unlocked firearm in the home

Table 1. Demographic Characteristics of the Study Sample

Characteristic	No. (%) of Sample*
Age of respondent, y (n = 388)	
<20	5 (1.3)
20-29	61 (15.7)
30-39	122 (31.4)
40-49	136 (35.1)
50-59	54 (13.9)
>60	10 (2.6)
Age of children in the home, not mutually exclusive, y (n = 392)	
Any <5	117 (29.8)
Any 5-12	216 (55.1)
Any 13-17	187 (47.7)
Mutually exclusive child age groups, y (n = 333)†	
All <13 (n = 333)	223 (67.0)
All <5 (n = 223) †	60 (26.9)
All 5-12 (n = 223) †	106 (47.5)
All 13-17 (n = 333)	110 (33.0)
Marital status (n = 391)	
Not married or living with a partner	54 (13.8)
Not married, living with a partner	30 (7.7)
Married	307 (78.5)
Race (n = 389)	
White	339 (87.1)
Black	18 (4.6)
Hispanic	14 (3.6)
Other	18 (4.6)
Sex (n = 392)	
Male	230 (58.7)
Female	162 (41.3)
Level of educational attainment (n = 391)	
Attended or completed high school	130 (33.2)
Attended college or another type of higher education	154 (39.4)
Completed a 4-y college degree	107 (27.4)

*Totals may not sum to 392 because of missing data.

†Excludes 59 respondents with children in multiple age groups.

(41.7% vs 28.8%; $P < .05$). Findings were similar, but not statistically significant, for keeping firearms stored loaded and both loaded and unlocked.

An alternative explanation for the associations between children's ages and firearm storage practices is that parents of older children are less likely to have safe storage practices. Because parents whose children were all aged 13 to 17 years were about 10 years older on average than parents whose children were all younger than 13 years, we sought to test this alternative explanation. When we examined storage practices by mean age of respondents, we did not find evidence that older parents had less safe firearm storage practices. When we analyzed all 392 respondents, the mean age of the respondents with unsafe storage practices was not substantially different than the mean age of the respondents without unsafe storage practices (data not shown).

A secondary finding is that children of all ages have access to unsafely stored firearms in their homes. More than one third of the parents in this sample said there was a gun in their home that was stored loaded, unlocked, or both. This represents a threat to the safety of young people.

As with most survey research, these data may be subject to bias because of inaccurate recall, lack of knowledge, or social desirability. An additional limitation is that some respondents chose not to disclose information about how firearms were stored, or about how old their children were. This resulted in missing data, including 14.3% of the respondents with missing data on the presence of a firearm stored unlocked; 10.5% with missing data on the presence of a firearm stored loaded and unlocked; and 4.8% with missing data on the presence of a firearm stored loaded. It is unclear how the results would differ with complete information. Because of this limitation, it is important for future studies examining firearm storage practices to report information on the ages of children to confirm the validity of our findings. Nevertheless, the proportion of respondents with a loaded firearm (21.7%) or an unlocked firearm (31.5%) obtained from this investigation were comparable to estimates from other studies (14%-30% and 43% respectively).¹

As young people become adolescents, parents may become less vigilant about keeping firearms stored securely. This assertion is supported by the present research, as well as by studies on parents' attitudes about firearm safety,^{18-20,28} in which authors concluded that parents were more likely to believe that adolescents, com-

Table 2. Comparison of Firearm Storage Practices in Homes With Younger Children vs Adolescents*

	Total (N = 392)	Children Age Groups, y†		PR (95% CI)‡
		All 0-12 (n = 223)	All 13-17 (n = 110)	
Any unlocked firearm (n = 336)	106/336 (31.5)	57/198 (28.8)	35/84 (41.7)	1.48 (1.04-2.02)
Any loaded firearm (n = 373)	81/373 (21.7)	44/216 (20.4)	26/102 (25.5)	1.25 (0.82-1.91)
Any unlocked and loaded firearm (n = 351)	29/351 (8.3)	14/205 (6.8)	9/92 (9.8)	1.43 (0.64-3.19)

Abbreviations: CI, confidence interval; PR, prevalence ratio.

*Data are expressed as number (percentage) of respondents unless otherwise indicated. The listed numbers of subjects represent only nonmissing observations.

†Excludes the 59 respondents with children in both age groups.

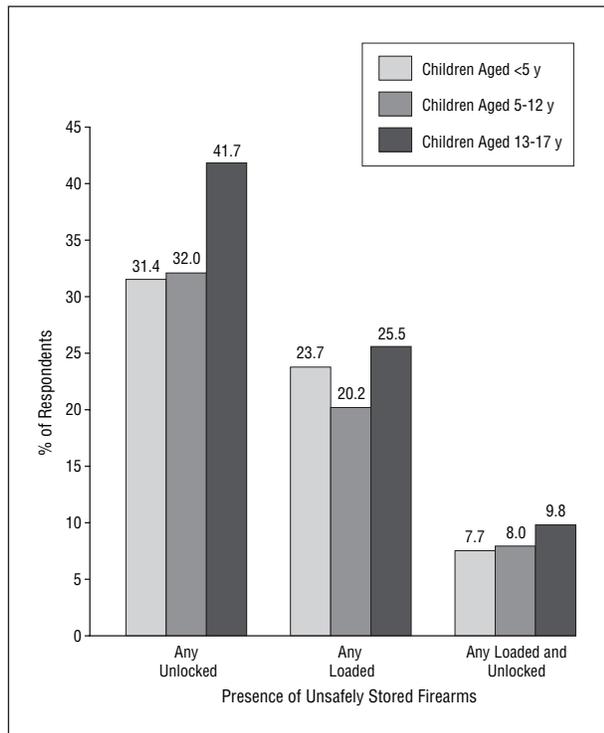


Figure. Reported firearm storage practices stratified by the age of the young people living in the home. Age categories are mutually exclusive. Respondents with children in more than 1 age group were excluded from the analyses.

pared with younger children, are old enough to exhibit good judgment around firearms. This belief creates a situation in which adolescents have easy access to a lethal means with which to kill themselves or to hurt others. Unfortunately, our study did not inquire about parents' perceptions of their children being injured with a firearm in the home, limiting our ability to assess whether the perception of susceptibility is, in fact, the intervening variable between the age of the children in the home and storage practices.

Safe storage practices have the potential to reduce the risk of death by limiting access to the most lethal means of injury.⁵⁻⁸ In recent years, public health and medical professionals have worked to educate gun owners, and gun-owning parents in particular, about the importance of safe storage practices through face-to-face counseling, mass media campaigns, and legislation.²⁹⁻³⁷ Anticipatory guidance by pediatricians has been a leading strategy for promoting safe firearm storage.^{30,33,34,38,39} Although important, most of these promotional efforts focus on preventing unintentional injury (rather than suicide) and may have the greatest influence on parents of children younger than 13 years. As an example, a billboard for 1 media campaign included a child-sized coffin and the slogan: "Buy a box for your gun, not for your kid."³⁷ In our attempts to keep young children safe, we may be leaving behind adolescents, who are significantly more at risk for gun injuries than younger children. In the future, it may be important for educational efforts to purposefully include messages that are directly targeted to parents of adolescents. A specific recommendation for reaching parents of adolescents is more firearm safety education

outside of pediatric clinics because many adolescents do not visit pediatricians or their parents do not accompany them to the physicians' offices.

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Poetry in Pediatrics

Evidence-Based Relief for Grandparents

They're all asleep now so that each of my elderly alpha synuclein particles snuggles gently against its chosen dendritic spray, waiting for the first of five grandchildren to wake up frightened, look for school clothes, look for their mom, and ask for water, while ignoring a grandparent's slowly capitulating struggle with his overwhelming sense of entropy, which can be delightfully stalled for a few nanoseconds while watching a middle-school dance recital, or a seven-boy tag-team football game, or even by listening to precise instructions for making cherry tapioca.

Ed Spudis, MD

*Alpha synuclein tauopathy references are available from recognized journals.