Firearm Storage in Homes With Children With Self-Harm Risk Factors

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abstract

OBJECTIVES: To describe firearm storage practices in homes with children who have versus do not have self-harm risk factors.

METHODS: A cross-sectional analysis of a nationally representative probability-based online survey of US adults conducted in 2015 (n = 3949; response rate 55%). Respondents self-reported whether they lived with children and were a caretaker/health care decision-maker for a child. Household firearm ownership was ascertained for all respondents; how firearms were stored in homes with guns was asked of gun owning respondents only; all respondents were asked whether their child had a history of the following self-harm risk factors: depression, mental health conditions other than depression, or attention-deficit/hyperactivity disorder.

RESULTS: Household firearms were present in 43.5% (95% confidence interval [CI]: 34.4–64.7) of homes with children who had a history of self-harm risk factors (n = 52), compared with 42.3% (95% CI: 35.2–49.7) of homes in which no child had self-harm risk factors (n = 411). Among parents or caretakers with firearms, 34.9% (95 % CI: 20.2–53.2) stored all guns locked and unloaded when they had a child with a history self-harm risk factors, compared with 31.8% (95% CI: 25.9–38.3) when none of their children had such a history.

CONCLUSIONS: Millions of US children live in homes in which firearms are left loaded or unlocked or both. A child's history of depression, mental health conditions other than depression, or attention-deficit/hyperactivity disorder does not appear to appreciably influence caretaker decisions about whether to (1) have firearms in the home, or (2) store all household firearms in accordance with American Academy of Pediatrics recommendations (ie, locked and unloaded).

FREE

WHAT'S KNOWN ON THIS SUBJECT: In 2 studies from the early 2000s, authors suggest that adolescents' mental health conditions are not associated with easy access to firearms or to firearm storage practices.

WHAT THIS STUDY ADDS: Contemporary, nationally representative estimates of how a child's risk of self-harm is related to parental decisions about whether to bring firearms into their home, and if so, how those firearms are stored.

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In 2015, the most recent year for which mortality data are available, suicide was the second leading cause of death for children aged 10 to 17 years of age.[1] For children in this age group, firearms accounted for over 40% of all suicides.[1] Guidelines intended to reduce firearm injury to children, first issued by the American Academy of Pediatrics (AAP) in 1992,[2] assert that whereas the safest home for a child is one without firearms, risk can be reduced substantially, although not eliminated, by storing all household firearms locked, unloaded, and separate from ammunition. The AAP recommendations reflect 3 well-established observations: (1) the source of most of the firearms involved in suicide (and unintentional firearm deaths) among children is their home,[3] (2) the presence of guns in a child's home substantially increases the risk of suicide (and unintentional firearm death),[4–17] and (3) the risk of unintentional and self-inflicted firearm injury is lower in homes that store firearms unloaded (compared with loaded) and locked (compared with unlocked).[18]

Despite AAP recommendations to make firearms less accessible to children, and the fact that mental health conditions increase the likelihood of suicidal behavior,[19] little is known about whether parents whose children have mental health conditions are any less likely to live in homes with firearms, or for that matter, whether in homes with guns and children, household firearm storage depends on whether children in the home have a history of self-harm risk factors. We are aware of only 2 pediatric studies in which the authors examined related, but distinct questions. In the first study, a nationally representative sample of adolescents interviewed between 2001 and 2003, the authors found that those with self-reported mental health conditions were as likely to report easy access to firearms as were adolescents without mental health conditions.[20] Firearm storage practices were not ascertained. In the second study, a 2004 survey of adolescents' parents or guardians enrolled in a managed care plan who lived in homes with firearms, the authors found that adolescents with a diagnosis of depression or bipolar disorder (based on medical claims data) compared with adolescents without mental illness were neither more nor less likely to live in homes in which all firearms were stored locked, any firearms were stored loaded, or all firearms were stored unloaded and locked.[21]

The current nationally representative study examines (1) whether parents whose children have self-harm risk factors are any less (or more) likely to live in homes with guns, and (2) whether parents with firearms store their household guns more (or less) safely when a child of theirs has a history of self-harm risk factors.

METHODS

Design and Sampling

We used data from a Web-based survey designed by the authors [D.A., M.M.] and conducted by the survey firm Growth for Knowledge (GfK) to assess firearm ownership, storage practices, and use among a nationally representative sample of US adults. Respondents were drawn from GfK's KnowledgePanel (KP), a group of ~55 000 US adults selected (on an ongoing basis) with an equal probability of selection. All panel members, except those currently serving in the US Armed Forces, were eligible to participate. Gun owners and veterans were oversampled from the KP; sampling weights supplied by GfK were applied such that estimates from the survey are representative of US adults (aged ≥18 years) in 2015.

Survey pretesting occurred in March 2015, with administration of the final survey in April 2015. Potentially eligible panel members received a notification e-mail letting them know that a new survey was available for them to take. No description of the survey content accompanied the invitation. This e-mail notification contained a link that sent them to the survey questionnaire. No login name or password was required. After 3 days, automatic e-mail reminders were sent to all nonresponding panel members in the sample. Participants completed the main survey within a median of 14 minutes.

Unique identifiers linked respondents in our survey to routine profile data collected by GfK on all KP panel members to ascertain self-reported mental and behavioral health conditions for respondents and their children. Response to GfK surveys is motivated through a point system by which responders accrue points that are redeemable for merchandise, cash or participation in sweepstakes. All panel members were eligible for survey participation except those serving on active duty in the US Armed Forces. The Institutional Review Board of Northeastern University approved the study.

GfK structures recruitment for the KP with the goal of having the resulting panel represent the adult population of the United States with respect to a broad set of geodemographic distributions as well as particular subgroups of hard-to-reach adults (for example, those without a landline telephone or those who primarily speak Spanish). For selection of general population samples from KP, GfK uses an equal probability of selection method design by weighting the entire KP to the benchmarks from the latest March supplement of the US Census Current Population Survey (see Supplemental Information for details). Sampling weights supplied by GfK were applied such that estimates made from the survey are representative of US adults

(≥18 years). We used weighted percentages and 95% confidence intervals (CIs) to describe outcomes.

Measures

Household gun ownership was assessed by asking respondents, "Do you or does anyone else you live with currently own any type of gun?" Personal gun ownership was assessed with a follow-up question: "Do you personally own a gun?" Gun owners were then asked follow-up questions about various storage practices for their household guns (eg, the number of guns stored loaded and unlocked, loaded and locked, unloaded and unlocked, and locked and unloaded).

We classified household firearms based on the least safely stored firearm. After having ascertained how many handguns and how many long guns a respondent owned, respondents were asked separately about the number of handguns and then about the number of long guns stored (1) loaded and unlocked, (2) unloaded and locked, and (3) in some other manner. For each type of gun we asked, "how many are stored locked and unloaded?"; the respondent would answer with an integer. Storage was not ascertained about guns individually (unless the respondent owned only 1 handgun and/or 1 long gun). Responses were sorted into 1 of 3 mutually exclusive, hierarchical, and collectively exhaustive categories: Category A (at least 1 gun loaded and unlocked); Category B (no guns in Category A but at least 1 gun either loaded and locked, or unlocked and unloaded), and Category C (all guns stored locked and unloaded). We also characterized household firearm storage more broadly, into 2 potentially overlapping categories: (1) any firearms stored unlocked, and (2) any stored loaded.

Basic demographic information was also elicited, as was information about the number of children in the household and whether any of these children fit into 3 mutually exclusive age categories (between 0–5 years, 6–12 years but none younger, and 13–17 years of age but none younger).

Because not all adults who live in homes with children are the child's parent or guardian, we further ascertained the relationship between adult respondents who live in homes with children by asking respondents if they were "a caregiver or health care decision-maker for a child under the age of 18?" Hereafter we refer to respondents who responded affirmatively to the caretaker and guardian question as "parents." Members of the GfK panel were also asked: "Are you a caregiver for a child under 18 with any of the following medical conditions (eg, depression)." Respondents could answer "yes" or "no" to the following 3 categories of conditions: attention-deficit/hyperactivity disorder (ADHD) or attention-deficit disorder, depression, and mental health conditions other than depression. Respondents who answered "yes" to any of these 3 categories of established self-harm risk factors[22–24] were said to have a child with a self-harm risk factor. Respondents were not asked more specifically about these conditions (eg, we do not know whether children said to have these conditions ever received a formal diagnosis, or if respondents were asked whether their child had other mental health or behavioral health conditions more specifically).

We conducted all analyses by using Stata IC 14 (StataCorp, College Station, TX), with use of appropriate weighting commands (using the weight variable provided by GfK) to generate national estimates and following the Strengthening the Reporting of Observational Studies in Epidemiology guidelines for reporting.[25]

RESULTS

Of the 7318 invited panel members who received the survey, 4165 began the survey and 3949 completed it (excluding 48 active-duty military personnel who began the survey but were ineligible to complete it). This yielded a survey completion proportion of 54.6% based on the formula recommended for calculating response proportions for Web panels.[26] Characteristics of the underlying sample are presented in Table 1.

Firearm Prevalence

Approximately 1 in 3 US households contained firearms (34.8%; 95% CI: 32.2–36.8), irrespective of whether the household contains children (33.4%; 95% CI: 29.1–38.0), or not (34.9%; 95% CI: 29.1–38.0) (Fig 1). Among the subset of adults who self-identified as a caregiver or health care decision-maker for a child under the age of 18, ∼2 in 5 households contained firearms (42.4%; 95% CI: 35.7–49.4), whether the children in the household had a history of self-harm risk factors (43.5%; 95% CI: 24.0–65.2), or not (42.3%; 95% CI: 35.2–49.7) (Fig 1).

Firearm Storage

Among parents who own guns, only 1 in 3 stored all household firearms locked and unloaded, regardless of whether their child had or did not have a history of depression, mental health conditions other than depression, or ADHD (34.9% [95% CI: 20.2–53.2] vs 31.8% [95% CI: 25.9–38.3], respectively) (Fig 1). The proportion of gun-owning parents who store at least 1 household firearm both loaded and unlocked is lower, but not significantly so, for parents whose children have a history of these self-harm risk factors, compared with parents none of whose children have such a history (11.6% [95% CI: 4.3–27.6] vs 20.3% [95% CI: 15.3–26.4], respectively) (Fig 1). Gun-owning

TABLE 1 Characteristics of the Underlying Sample

Sex of Respondent	Underlying Sample (n = 3949), % (95% CI)	Gun-Owning Respondents (n = 2072), % (95% CI)
Male	48.4 (45.3–51.6)	72.1 (69.8–74.4)
Female	51.6 (48.5–54.8)	27.9 (25.6–30.3)
Age of respondent, y		
18–29	19.0 (16.3–21.8)	11.6 (9.9–13.6)
30–44	22.9 (20.1–25.7)	22.3 (20.1–24.6)
45–59	28.5 (25.7–31.3)	31.6 (29.3–34.0)
≥60	29.6 (26.9–32.3)	34.5 (32.3–36.8)
Region		
Northeast	18.3 (15.9–21.1)	12.4 (10.9–14.1)
Midwest	22.4 (19.9–25.0)	23.8 (21.8–25.9)
South	36.9 (33.9–39.9)	43.1 (40.6–45.6)
West	22.4 (19.9–25.2)	20.8 (18.8–22.9)
Urbanicity		
Urban	23.1 (20.4–26.1)	16.2 (14.3–18.2)
Suburban	50.6 (47.5–53.8)	44.2 (41.7–46.7)
Rural	26.3 (23.8–28.9)	39.6 (37.2–42.2)
Ethnicity		
White (Non-Hispanic)	70.5 (67.2–73.5)	80.5 (78.0–82.7)
Non-white	29.5 (26.5–32.8)	19.5 (17.3–22.0)
Income, $		
<75,000	57.1 (54.0–60.1)	51.1 (48.6–53.6)
≥75,000	43.0 (39.9–46.1)	48.9 (46.4–51.4)
Education		
<12	10.5 (8.5–13.0)	6.0 (4.7–7.2)
High school graduate	29.5 (26.7– 32.4)	31.3 (28.9–33.8)
>High school	60.0 (56.8–63.1)	62.9 (60.4–65.4)
The following were asked only of respondents who own firearms		
Average No. guns owned	—	4.85
Median No. guns owned	—	2

—, not applicable.

parents who have children with a history of depression, mental health conditions other than depression, or ADHD are also not significantly more likely to store all household firearms locked, compared with those whose children do not have such a history of self-harm risk factors (62.0% [95% CI: 44.8–76.6] vs 52.2% [95% CI: 45.3–58.9], respectively) (Table 2). Likewise, the proportion of gun-owning parents who store all household firearms unloaded does not does not depend on whether their child has or does not have a history of mental health conditions or ADHD (58.7% [95% CI: 41.2–74.3] vs 57.9% [95% CI: 51.0–64.5], respectively) (Table 2).

Characteristics of Households With Firearms and Children

In homes that contain firearms, parents whose children have a history of mental health conditions or ADHD tend to have more children and a greater proportion of children in older age groups. For example, approximately one-third (36.1%; 95% CI: 30.5–42.1) of parents, none of whose children have a history of mental health conditions or ADHD, have children 0 to 5 years of age compared with 7% (95% CI: 2.3–19.2) of parents who have at least 1 child with such a history (Table 2). Whether a child has a history these self-harm risk factors does not appear to appreciably affect the distribution of the other measured parental and household characteristics.

DISCUSSION

To our knowledge, in the current study, we are the first to use a nationally representative sample to examine whether having a child with a history of mental health conditions or ADHD is associated with parental reports of (1) household firearm prevalence, and (2) how household firearms are stored in homes with guns and children. Based on our findings, it appears that having a child with self-harm risk factors does not, on average (1) factor into parents' decision to have firearms in their homes, or (2) materially affect whether parents store all household guns in accordance with AAP recommendations (locked and unloaded).[2]

Our finding that self-harm risk factors among US children are not associated with household firearm prevalence mirrors findings from 4 previous US studies of adults from the early 2000s, in each of which authors found that the prevalence of mental health disorders was fairly balanced across households with firearms versus without firearms.[21,27–29] Similarly, our

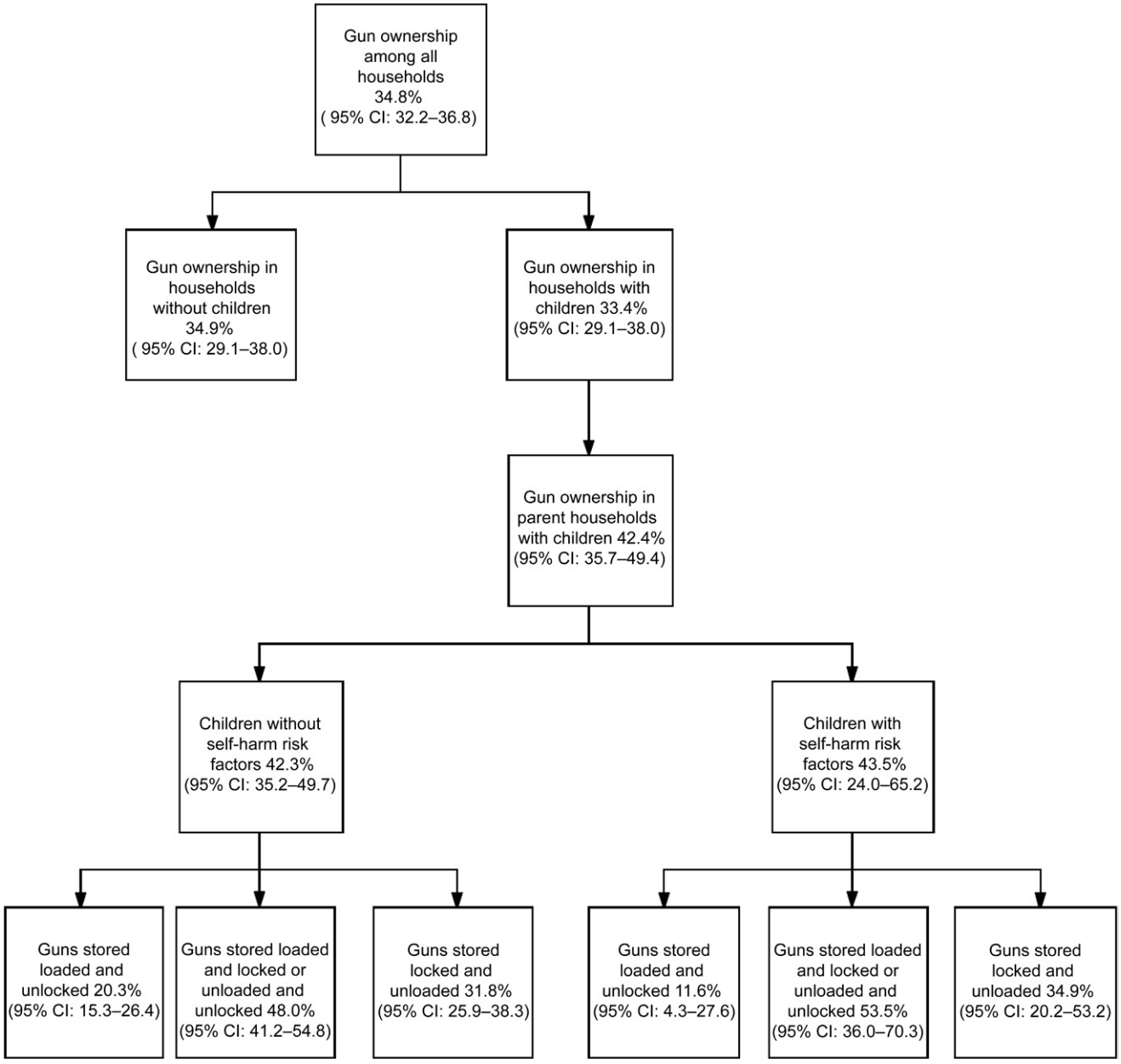

FIGURE 1
Flowchart depicting household firearm ownership and firearm storage practices among households with guns and children with suicide risk factors versus without suicide risk factors.

finding that parent's report of their child's history of self-harm risk factors did not predict whether parents stored household firearms locked and unloaded is consistent with findings from a nationally representative study of adults that failed to find an association between an adult's mental health history and the likelihood of living in a home in which firearms were stored loaded and unlocked.[28]

Moreover, our findings regarding storage practices are in line with a nationally representative survey of 13 to 18 year old adolescents who were interviewed between 2001 and 2003 and asked a related, but distinct, question about self-reported access to firearms in the home. In that study, adolescents with self-reported mental health risk factors for suicide were as likely to report easy access to household firearms as were adolescents without risk factors for suicide.[20]

Our findings that household firearm prevalence in homes with children is modestly higher, albeit with overlapping tails of the 95% CIs, when prevalence estimates are based on respondents who self-identify as a child's caregiver or health care decision-maker (eg, parents) compared with estimates

TABLE 2 Demographics of Parent Respondents Living in Households With Firearms, Comparing Households With Children Who Have Versus Do Not Have a History of Self-Harm Risk Factors

	Gun Household; Child Has a History of Mental Health Conditions or ADHD (n = 52), % (95% CI)	Gun Household; Child Does Not Have a History of Mental Health Conditions or ADHD (n = 411), % (95% CI)
Sex of respondent		
Male	36.8 (23.7–52.1)	44.2 (38.6–49.9)
Female	63.3 (47.9–76.3)	55.8 (50.1–61.4)
Age of respondent, y		
18–29	10.1 (3.3–26.9)	19.7 (14.8–25.7)
30–44	65.4 (50.1–78.0)	59.7 (53.9–65.4)
45–59	19.0 (10.9–30.9)	18.7 (15.1–22.9)
≥60	5.6 (2.0–14.8)	1.9 (1.1–3.3)
Region		
Northeast	9.0 (3.9–19.5)	10.6 (7.8–14.2)
Midwest	18.8 (10.0–32.3)	28.6 (23.8–34.0)
South	57.2 (41.7–71.4)	39.2 (33.5–45.1)
West	15.0 (7.0–29.2)	21.7 (17.4–26.6)
Urbanicity		
Urban	11.8 (5.2–24.7)	14.0 (10.5–18.4)
Suburban	64.6 (49.0–77.6)	52.9 (47.1–58.6)
Rural	23.6 (13.4–38.3)	33.1 (28.1–38.6)
Ethnicity		
White (Non-Hispanic)	83.5 (61.2–94.2)	79.4 (73.2–84.4)
Non-white	16.5 (5.8–38.8)	20.6 (15.6–26.8)
Income, $		
<75,000	33.3 (21.1–48.3)	43.4 (37.8–49.2)
≥75,000	66.7 (51.7–78.9)	56.6 (50.8–62.2)
Education		
<12	5.3 (1.5–17.1)	4.7 (2.7–8.1)
High school graduate	23.0 (12.8–37.9)	21.8 (16.9–27.6)
>High school	71.7 (56.4–83.2)	73.5 (67.5–78.7)
No. adults in household		
1	5.4 (1.5–17.1)	3.1 (1.8–5.2)
2	65.0 (47.3–79.4)	78.3 (72.8–83.0)
≥3	29.7 (16.0–48.2)	18.6 (14.2–24.1)
No. children in household		
1	27.9 (16.7–42.8)	39.7 (34.3–45.3)
2	36.3 (23.3–51.6)	41.3 (35.6–47.3)
3	18.4 (9.6–32.5)	12.4 (9.2–16.5)
≥4	17.4 (6.2–40.2)	6.6 (4.3–10.0)
Age of children, y		
0–5	7.0 (2.3–19.0)	36.1 (30.5–42.1)
6–12 (none younger)	36.3 (21.7–54.0)	30.8 (25.9–36.1)
13–17 (none younger)	56.8 (40.2–71.9)	33.2 (28.1–38.6)
Marital status		
Married	85.4 (72.7–92.7)	86.2 (81.2–90.1)
Live with partner	4.8 (1.4–14.9)	8.4 (5.5–12.5)
Other	9.9 (4.2–21.6)	5.4 (3.0–9.5)
Distribution of self-harm risk factors in households with guns		
Depression	1.9 (1.0–4.0)	—
Mental health condition other than depression	2.0 (1.0–4.0)	—
ADHD	9.4 (6.7–13.1)	—
Gun-related characteristics (reported by respondents who personally owned firearms)		
	n = 37	n = 251
Average No. guns owned	3.6 ± 0.6	4.6 ± 0.5
Distribution of guns owned		
1 gun	39.2 (24.1–56.6)	28.1 (22.2–34.8)
2 guns	15.2 (6.2–32.7)	23.1 (17.7–29.5)
≥3 guns	45.7 (29.7–62.7)	48.8 (42.0–55.6)
Gun storage (mutually exclusive and collectively exhaustive categories)		
Loaded and unlocked	11.6 (4.3–27.6)	20.3 (15.3–26.4)

TABLE 2 Continued

	Gun Household; Child Has a History of Mental Health Conditions or ADHD (n = 52), % (95% CI)	Gun Household; Child Does Not Have a History of Mental Health Conditions or ADHD (n = 411), % (95% CI)
Loaded and locked and/or unloaded and unlocked	53.5 (36.0–70.3)	48.0 (41.2–54.8)
Locked and unloaded	34.9 (20.2–53.2)	31.8 (25.9–38.3)
Gun storage, broad overlapping categories		
Any unlocked	38.0 (23.4–55.2)	47.8 (41.1–54.7)
Any locked	62.0 (44.8–76.6)	52.2 (45.3–58.9)
Any unloaded	58.7 (41.2–74.3)	57.9 (41.2–74.3)
Any loaded	41.3 (25.7–58.8)	42.1 (35.5–49.0)

—, not applicable.

based on a randomly chosen adult living in a home with children (eg, an adult sibling, a grandparent, a related or unrelated adult boarder) has not previously been reported (nor to our knowledge, assessed). Other survey-based firearm-related reporting gaps have been well documented in the literature, especially with respect to sex.[30–33] The authors of these previous studies all suggest that household prevalence estimates for a variety of firearm related attributes (eg, presence of guns, number of guns, how guns are stored in the home) depend in nontrivial ways on which household member contributes information to estimates. Historically, estimates based on reports of respondents who are less familiar with guns (eg, females, nongun owners) appear to underestimate household prevalence and overestimate how safely guns are stored (the latter is why, by design, our study ascertained storage practices from the gun owner only). The extent to which prevalence discrepancies in our study, or in previous work, reflect the role of chance, respondent-dependent differential knowledge about household firearm status, or differential reluctance to report accurate knowledge of firearm status is unknown.

Several additional considerations should be kept in mind when interpreting findings from our survey. First, our null finding with respect to a child's history of self-harm risk factors affecting the proportion of parents reporting that they store all household firearms in accordance with the AAP recommendations may, at least in part, be confounded by the fact that older children are more likely to have a history of mental health and behavioral conditions (as we observe in our study). In previous studies, authors have shown that although the risk of firearm injury is greater for adolescents than for younger children, parents tend to adopt safer firearm storage practices when they have young children, compared to when they have only older children.[33,34] Our sample size is not large enough to generate precise estimates of the relationship between firearm storage practices and a child's mental and behavioral health history while adjusting for the age of children in the home or, for that matter, by other potentially relevant subgroups, such as type of firearm (ie, handgun versus long gun). Our sample size also precludes stratifying our measure of self-harm risk factors, and therefore precludes examining effect modification by more granular measures of mental or behavioral health. Lastly, our study is not powered to know whether the nonsignificant difference by self-harm risk factor status that we observed for the least safe storage practice measured (ie, 11% vs 20% loaded and unlocked) is due to the play of chance, or to real differences in this particular storage practice. Even so, our findings nevertheless suggest that too many children in every age category and regardless of their history of self-harm risk factors live in homes in which firearms are stored in less than an ideal fashion.

Second, we categorize children as having a mental or behavioral health condition based on parents' response to survey items that have not been validated. This could result in misclassification if parents are not aware of their child's full condition or withhold relevant information. To the extent that such misclassification is relevant, extrapolations from our findings would likely underestimate the number of children with self-harm risk factors living in homes with firearms, but it might also obscure differences in storage practices when children have conditions not reported or if storage is related to the severity of a mental or behavioral health condition or its recency of onset. Authors of larger studies that use validated measures of mental health and behavioral conditions, capture the severity of underlying conditions and report recency of disorder onset could add meaningfully to the findings from the current study.

Third, as with findings from all self-reported surveys, our findings are subject to potential inaccuracies because of a social desirability bias that might lead parents to report spuriously safe storage practices, especially if their children have risk factors for self-harm. However, with our findings that one-third of all parents who own guns report storing

household firearms unloaded and locked up, independent of whether they had reported having a child with self-harm risk factors, we suggest that social desirability bias may not play a dominant role in our findings. With regard to social desirability bias more generally, online panel surveys, such as ours, have been shown to reduce social desirability bias and yield more accurate estimates of respondent characteristics compared with alternative methods used to elicit opinions, such as telephone surveys.[35] Reduced social desirability bias, along with our decision to ascertain storage information from gun owners only, and secular trends favoring handgun over long gun ownership (and protection rather than recreation as a primary reason to own guns),[36] may help explain why we find less optimal storage practices in homes with children and guns compared with previous studies.[33,34,37] Another advantage of online panels is high completion rates for those who begin the survey and the availability of information about panelists who do not elect to take the survey in the first place.[26] In our study, 99% of respondents completed the survey, fewer than 1% declined to answer our stem question about household gun ownership, no one declined to answer the subsequent question regarding whether they personally owned a gun, and fewer than 3% declined to answer the questions about storage. Finally, our survey completion rate (55%) is higher than the rates for typical nonprobability, opt-in, online surveys, which are 2% to 16%[38]; higher than those of previous national injury surveys that included questions about firearm ownership[39,40]; and similar to those from other surveys conducted by GfK.[37] Nevertheless, panel members who chose not to participate in our survey may have differed in important ways related to their storage practices compared with panel members who chose to participate.

CONCLUSIONS

Despite these limitations, our findings indicate that parents' decision to store firearms in their home does not materially depend on whether their child has self-harm risk factors, nor, moreover, does having a child with a history of self-harm risk factors appear to increase the likelihood that parents in homes with firearms will store their household guns as safely as possible. Indeed, for homes with children and guns, the odds are roughly 2 to 1 that firearms are not stored in accordance with recommendations promulgated by the AAP, regardless of whether children in the home have a history of self-harm risk factors. Given the prevalence of household firearms in the United States, our findings suggest that millions of US children are placed at substantially higher risk of fatal firearm injury, especially suicide, than would be the case were parents to follow guidelines first put forward by the AAP more than a quarter century ago.

ABBREVIATIONS

AAP: American Academy of Pediatrics
ADHD: attention-deficit/hyperactivity disorder
CI: confidence interval
GfK: Growth for Knowledge
KP: KnowledgePanel

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REFERENCES

1. Centers for Disease Control and Prevention. WISQARS fatal injury reports. 2017. Available at: https://webappa.cdc.gov/sasweb/ncipc/mortrate.html. Accessed February 10, 2017
2. Dowd MD, Sege RD; Council on Injury, Violence, and Poison Prevention Executive Committee; American Academy of Pediatrics. Firearm-related injuries affecting the pediatric population. *Pediatrics*. 2012;130(5). Available at: www.pediatrics.org/cgi/content/full/130/5/e1416
3. Grossman DC, Reay DT, Baker SA. Self-inflicted and unintentional firearm injuries among children and adolescents: the source of the firearm. *Arch Pediatr Adolesc Med*. 1999;153(8):875–878
4. Miller M, Hemenway D. The relationship between firearms and suicide: a review of the literature. *Aggress Violent Behav*. 1999;4(1):59–75
5. Brent DA. Firearms and suicide. *Ann N Y Acad Sci*. 2001;932:225–239; discussion; 239–240
6. Anglemyer A, Horvath T, Rutherford G. The accessibility of firearms and risk for suicide and homicide victimization among household members: a systematic review and meta-analysis. *Ann Intern Med*. 2014;160(2):101–110
7. Kellermann AL, Rivara FP, Somes G, et al. Suicide in the home in relation to gun ownership. *N Engl J Med*. 1992;327(7):467–472
8. Brent DA, Perper J, Moritz G, Baugher M, Allman C. Suicide in adolescents with no apparent psychopathology. *J Am Acad Child Adolesc Psychiatry*. 1993;32(3):494–500
9. Brent DA, Perper JA, Allman CJ, Moritz GM, Wartella ME, Zelenak JP.

The presence and accessibility of firearms in the homes of adolescent suicides. A case-control study. *JAMA*. 1991;266(21):2989–2995

10. Brent DA, Perper JA, Moritz G, Baugher M, Schweers J, Roth C. Firearms and adolescent suicide. A community case-control study. *Am J Dis Child*. 1993;147(10):1066–1071
11. Conwell Y, Duberstein PR, Connor K, Eberly S, Cox C, Caine ED. Access to firearms and risk for suicide in middle-aged and older adults. *Am J Geriatr Psychiatry*. 2002;10(4):407–416
12. Bailey JE, Kellermann AL, Somes GW, Banton JG, Rivara FP, Rushforth NP. Risk factors for violent death of women in the home. *Arch Intern Med*. 1997;157(7):777–782
13. Wiebe DJ. Homicide and suicide risks associated with firearms in the home: a national case-control study. *Ann Emerg Med*. 2003;41(6):771–782
14. Wintemute GJ, Parham CA, Beaumont JJ, Wright M, Drake C. Mortality among recent purchasers of handguns. *N Engl J Med*. 1999;341(21):1583–1589
15. Dahlberg LL, Ikeda RM, Kresnow M-J. Guns in the home and risk of a violent death in the home: findings from a national study. *Am J Epidemiol*. 2004;160(10):929–936
16. Miller M, Azrael D, Hemenway D. Firearm availability and unintentional firearm deaths, suicide, and homicide among 5-14 year olds. *J Trauma*. 2002;52(2):267–274; discussion 274–275
17. Miller M, Azrael D, Hemenway D, Vriniotis M. Firearm storage practices and rates of unintentional firearm deaths in the United States. *Accid Anal Prev*. 2005;37(4):661–667
18. Grossman DC, Mueller BA, Riedy C, et al. Gun storage practices and risk of youth suicide and unintentional firearm injuries. *JAMA*. 2005;293(6):707–714
19. Nock MK, Borges G, Bromet EJ, Cha CB, Kessler RC, Lee S. Suicide and suicidal behavior. *Epidemiol Rev*. 2008;30:133–154
20. Simonetti JA, Mackelprang JL, Rowhani-Rahbar A, Zatzick D, Rivara FP. Psychiatric comorbidity, suicidality, and in-home firearm access among a nationally representative sample of adolescents. *JAMA Psychiatry*. 2015;72(2):152–159
21. Simonetti JA, Theis MK, Rowhani-Rahbar A, Ludman EJ, Grossman DC. Firearm storage practices in households of adolescents with and without mental illness. *J Adolesc Health*. 2017;61(5):583–590
22. Gould MS, King R, Greenwald S, et al. Psychopathology associated with suicidal ideation and attempts among children and adolescents. *J Am Acad Child Adolesc Psychiatry*. 1998;37(9):915–923
23. Impey M, Heun R. Completed suicide, ideation and attempt in attention deficit hyperactivity disorder. *Acta Psychiatr Scand*. 2012;125(2):93–102
24. Allely CS. The association of ADHD symptoms to self-harm behaviours: a systematic PRISMA review. *BMC Psychiatry*. 2014;14:133
25. von Elm E, Altman DG, Egger M, Pocock SJ, Gøtzsche PC, Vandenbroucke JP; STROBE Initiative. The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement: guidelines for reporting observational studies. *Lancet*. 2007;370(9596):1453–1457
26. Callegaro M, DiSogra C. Computing response metrics for online panels. *Public Opin Q*. 2008;72(5):1008–1032
27. Miller M, Barber C, Azrael D, Hemenway D, Molnar BE. Recent psychopathology, suicidal thoughts and suicide attempts in households with and without firearms: findings from the National Comorbidity Study Replication [published correction appears in *Inj Prev*. 2009;15(4):288]. *Inj Prev*. 2009;15(3):183–187
28. Ilgen MA, Zivin K, McCammon RJ, Valenstein M. Mental illness, previous suicidality, and access to guns in the United States. *Psychiatr Serv*. 2008;59(2):198–200
29. Sorenson SB, Vittes KA. Mental health and firearms in community-based surveys: implications for suicide prevention. *Eval Rev*. 2008;32(3):239–256
30. Ludwig J, Cook PJ, Smith TW. The gender gap in reporting household gun ownership. *Am J Public Health*. 1998;88(11):1715–1718
31. Cook P, Sorenson SB. The gender gap among teen survey respondents: Why are boys more likely to report a gun in the home than girls? *J Quant Criminol*. 2006;22(1):61–76
32. Nelson DE, Powell K, Johnson CJ, Mercy J, Grant-Worley JA. Household firearm storage practices: do responses differ by whether or not individuals ever use firearms? *Am J Prev Med*. 1999;16(4):298–302
33. Azrael D, Miller M, Hemenway D. Are household firearms stored safely? It depends on whom you ask. *Pediatrics*. 2000;106(3). Available at: www.pediatrics.org/cgi/content/full/106/3/e31
34. Johnson RM, Miller M, Vriniotis M, Azrael D, Hemenway D. Are household firearms stored less safely in homes with adolescents?: Analysis of a national random sample of parents. *Arch Pediatr Adolesc Med*. 2006;160(8):788–792
35. Kreuter F, Presser S, Tourangeau R. Social desirability bias in CATI, IVR, and web surveys: the effects of mode and question sensitivity. *Public Opin Q*. 2008;72(5):847–865
36. Azrael D, Hepburn L, Hemenway D, Miller M. The stock and flow of US firearms: results from the 2015 National Firearms Survey. *Russell Sage Found J Soc Sci*. 2017;3(5):38–57
37. Okoro CA, Nelson DE, Mercy JA, Balluz LS, Crosby AE, Mokdad AH. Prevalence of household firearms and firearm-storage practices in the 50 states and the District of Columbia: findings from the Behavioral Risk Factor Surveillance System, 2002. *Pediatrics*. 2005;116(3). Available at: www.pediatrics.org/cgi/content/full/116/3/e370
38. Chang L, Krosnick JA. National surveys via RDD telephone interviewing versus the internet: comparing sample representativeness and response quality. *Public Opin Q*. 2009;73(4):641–678
39. Hepburn L, Miller M, Azrael D, Hemenway D. The US gun stock: results from the 2004 national firearms survey. *Inj Prev*. 2007;13(1):15–19
40. Betz ME, Barber C, Miller M. Suicidal behavior and firearm access: results from the second injury control and risk survey. *Suicide Life Threat Behav*. 2011;41(4):384–391

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