

Firearms Availability Among High-School Age Youth With Recent Depression or Suicidality

Maya Haasz, MD,^{a,b} Matthew G. Myers, MPH,^c Ali Rowhani-Rahbar, MD, MPH, PhD,^{d,e} Marc A. Zimmerman, PhD,^{b,c,f,g,h} Laura Seewald, MD,^{b,c,i} Rebecca L. Sokol, PhD,^{h,j} Rebecca M. Cunningham, MD,^{b,g,i} Patrick M. Carter, MD^{b,c,g,h,i}

abstract

BACKGROUND AND OBJECTIVES: Limiting firearm access is essential to decreasing teen suicide. Previous efforts have focused on household firearms; however, less is known about firearm access and possession among teens at increased suicide risk. Our objective was to estimate prevalence of firearm possession and access among high school-aged teens with recent depression and/or lifetime history of suicidality (DLHS).

METHODS: We conducted a probability-based, cross-sectional Web survey of 1914 parent-teen dyads between June 24, 2020, and July 22, 2020, with data weighted to generate a nationally representative sample of US teenagers (aged 14–18). Logistic regression analyses examined the difference between teens with and without DLHS for: (1) personal firearm possession, (2) perceived firearm access, and (3) method of firearm attainment.

RESULTS: Among high school-aged teens, 22.6% (95% confidence interval [CI], 19.4–25.8) reported DLHS, 11.5% (95% CI, 8.7–14.3) reported personal firearm possession, and 44.2% (95% CI, 40.2–48.2) endorsed firearm access. Teens experiencing DLHS had increased perceived access (adjusted odds ratio, 1.56; 95% CI, 1.07–2.28) compared with non-DLHS peers. There was no association between DLHS and personal firearm possession (adjusted odds ratio, 0.97; 95% CI, 0.47–2.00). Among teens reporting firearm possession, those with DLHS were more likely to have acquired it by buying/trading for it (odds ratio, 5.66; 95% CI, 1.17–27.37) and less likely receiving it as a gift (odds ratio, 0.06; 95% CI, 0.01–0.36).

CONCLUSIONS: High school-aged teens experiencing DLHS have higher perceived firearm access compared with lower-risk peers. Providers should speak directly to high school-aged teens at increased suicide risk about firearm access, in addition to counseling parents.



^aDepartment of Pediatrics, Section of Emergency Medicine, University of Colorado School of Medicine, Aurora, Colorado; ^bFirearm Safety Among Children and Teens (FACTS) Consortium, Ann Arbor, Michigan; ^cUniversity of Michigan Injury Prevention Center, School of Medicine; ^dMichigan Youth Violence Prevention Center; ^eDepartment of Health Behavior and Health Education, School of Public Health; ^fInstitute for Firearm Injury Prevention; ^gDepartment of Emergency Medicine, School of Medicine; and ^hSchool of Social Work, University of Michigan, Ann Arbor, Michigan; ⁱDepartment of Epidemiology, School of Public Health, University of Washington, Seattle, Washington; and ^jFirearm Injury & Policy Research Program, Seattle, Washington

Dr Haasz conceptualized and designed the study, and drafted the initial manuscript; Dr Carter conceptualized and designed the study, designed the data collection instruments, and coordinated and supervised data collection; Mr Myers designed the study and conducted the analyses; Drs Cunningham, Zimmerman, Rowhani-Rahbar, Sokol, and Seewald designed the study; and all authors reviewed and revised the manuscript, approved the final manuscript as submitted, and agree to be accountable for all aspects of the work.

DOI: <https://doi.org/10.1542/peds.2022-059532>

WHAT'S KNOWN ON THIS SUBJECT: Limiting access to firearms for youth at elevated risk for suicide is key to suicide prevention. Efforts to date have focused on improving locked storage of home firearms, but overall firearm access is poorly understood.

WHAT THIS STUDY ADDS: This study describes perceived firearm access among a nationally representative sample of high school-aged teenagers. We find that those with elevated suicide risk have increased perceived access to firearms as compared with non-high-risk peers.

To cite: Haasz M, Myers MG, Rowhani-Rahbar A, et al. Firearms Availability Among High-School Age Youth With Recent Depression or Suicidality. *Pediatrics*. 2023;151(6):e2022059532

Suicide is the second leading cause of death for high school-aged teens across the United States, with rates increasing over the past decade.¹⁻³ Firearms remain the most common and lethal mechanism for teen suicide deaths (aged 14–18 years) (44%),¹ with case fatality rates approaching 90%.⁴ Ecologic studies highlight the association between firearm availability and adolescent suicide rates,⁵ with individual-level case control studies demonstrating that access to an unsecured firearm is one of the most significant modifiable risk factors for teen suicide.⁶ Among US households with children aged <18 years, approximately one-third report having a firearm in the home, with two-thirds indicating that at least 1 is kept unsecured.^{7,8} Among households where caregivers indicate firearms are not accessible to children, ~40% of teens report knowing where a firearm is stored^{9,10} and 22% have handled 1 or more firearms at some point.⁹

Given firearm availability is a key risk factor for suicide among teens experiencing suicidal crises,^{5,6,11} limiting lethal means access remains 1 of the strongest evidence-based prevention strategies for youth at elevated suicide risk (ie, those with depression and/or expressed suicidality).¹²⁻¹⁴ Previous research has focused on teen access to firearms owned by caregivers. In 1 small cohort study ($n = 63$) of adolescent (aged <18 years) suicide conducted across 4 states, 75% of the firearms used in youth suicide attempts belonged to their parents (when the source of the firearm was known).¹⁵ Yet, the same study also demonstrated that, among cases where the source of the firearm was identified, 18% of firearms were personally “owned” by the adolescent (ie, teens maintained control of firearm access). Further, these studies also indicate that the origin of the

firearm remains unknown for up to a third of decedents,¹⁵ suggesting that we may be underestimating youth firearm access, especially locations outside the household (off-property locations).

Although researchers have examined the firearm sources for completed suicide cases, they have not identified methods by which adolescents who are at elevated suicide risk (eg, depressed or suicidal teens) obtain or access firearms. Assessing teen firearm possession and access has implications for understanding how youth may obtain firearms used in a suicide attempt, with the potential to inform tailored public health interventions addressing teen lethal means availability and firearm access, particularly those at elevated risk.

In this analysis, we examine data from a nationally representative sample of high school-aged teens (age 14–18 years) and their caregivers to:

1. describe prevalence and characteristics (method of attainment) of personal teen firearm possession and perceived access; and
2. examine the association between firearm possession or access among teens with and without depression and/or a lifetime history of suicidality (DLHS).

METHODS

Sample Population and Data Collection

Data are from a cross-sectional, dyadic survey of parents and their teenage youth (aged 14–18 years) conducted by Gallup for the Firearm Safety among Children and Teens Consortium. Participants were recruited from the Gallup Panel, a probability-based panel drawing from all 50 states and constructed to be broadly representative of the US population (across the 4 US census

regions). Gallup continuously recruits participants to serve on their panel using random-digit dialing (landlines and cell phones), and address-based sampling methods. Young adults (aged 18–34 years), individuals from lower educational backgrounds, and members of racial/ethnic minority groups are intentionally oversampled to construct the panel. For this study, eligible panel participants included parents of high school-aged youth reporting that their teen lived with them at least part of the time. Parents were defined as any adult (aged ≥ 18 years) self-identifying as a primary caretaker. Eligible parents were randomly sampled from the panel and sent e-mail invitations to participate (June 24, 2020–July 22, 2020); nonresponders were sent up to 8 reminders. After obtaining informed consent, caregivers were asked for permission to contact their child. If multiple eligible teens resided in the household, parents were asked to consider the teenager with the closest birthday. If parents gave permission to contact their child, the teen was invited to participate via a separate survey link. All teens provided assent (aged 14–17 years) or consent (aged 18 years) before participating. Parents and assenting teens self-administered the Web-based survey (~16.6 minutes per adult; ~13 minutes per teen), and each received \$5 for survey completion. A total of 2924 parents and 2140 teenagers consented to complete surveys. Participants were provided with information on mental health, substance use, and violence prevention resources (eg, National Suicide Lifeline), with additional resources specifically linked to affirmative answers to risk questions (ie, intimate partner violence hotline). The University of Michigan institutional review board reviewed and approved all study procedures. The present analysis was limited to the data collected from high school-aged teens.

Measures

Teen Firearm Possession

Firearm possession was assessed with a single item: “Do you personally have a gun that belongs to you?” Respondents were asked to exclude nonpowder firearms (ie, air guns, BB guns, starter pistols, paintball guns). Teens endorsing personal firearm possession were then asked about the method (gift, purchase, other) and source (family, peer, online seller, store, gun show, other) of firearm acquisition using adapted items from the Tulane Youth Study.¹⁶

Perceived Firearm Access

Perceived firearm access (yes/no) was defined as an affirmative answer to either on- or off-property access.

Perceived on-property access was assessed among teens endorsing access to an on-property firearm (including their own) using an adapted item from the Tulane Youth Study.¹⁶ This question asks about ease of access to firearms maintained within the home or on the property (eg, garage, car). Response options included <5 minutes, <1 hour, <2 hours, >2 hours, or none. For analysis, responses were dichotomized to either perceived on-property access (conceptualized as the ability to access a firearm regardless of timing) or no access. Perceived off-property access was assessed using a created item measuring access to firearms not maintained in the household (“If you wanted to access a gun other than those on your property, how easy do you think it would be to get 1?”). Responses were assessed using a 4-point Likert scale ranging from very easy to almost impossible and dichotomized for multivariable analysis to indicate perceived ability to access an off-property firearm (yes/no). Teens reporting that it would be very difficult or almost impossible to access an off-property

firearm were considered as having no off-property access. Teens reporting perceived off-property access were asked the potential acquisition sources for off-property firearms using a created, check-all-that-apply item (“How could you get this gun?”).¹⁶

DLHS

Past 2-week depression symptoms were measured using the patient health questionnaire (PHQ)-2 scale.¹⁷ Consistent with clinical recommendations, a summary score of ≥ 3 indicated a positive depression screen.¹⁷ Lifetime suicidality was measured using a single adapted item from the PHQ-9.¹⁸ Teens with a positive depression screen (yes/no) or a lifetime history of suicidality (yes/no) were characterized as positive for DLHS.

Sociodemographics

Demographic variables (age, race, ethnicity) were assessed using standard Gallup survey items. Gender identity was assessed using survey items from the Williams Institute.¹⁹ For analysis, responses other than female or male were collapsed to “other” given low base rates. Public assistance and geographic region as defined by the standard 4 census regions (Northeast, Midwest, South, West) were characterized using linked data from the parental survey.

Statistical Analysis

The analytic sample ($n = 1914$) included all teens with complete information on key variables; 11% were missing at least 1 variable and were excluded from analysis. To address the potential for systematic missingness, we examined excluded participants with the final analytic sample on the dependent variable (DLHS) and key independent variables, finding no differences between the samples. After descriptive analysis to characterize

the overall sample, unadjusted bivariate comparisons were performed for key sociodemographic and firearm variables. Next, 2 separate multivariable logistic regression models were constructed to examine relationships between DLHS and the firearm-related outcomes (firearm possession and firearm access) after controlling for a teen’s age, gender, public assistance, and region. All analyses incorporated survey weights to yield results that are nationally representative of the US teen population and are presented using weighted percentages and corresponding 95% confidence intervals (CIs). Statistical procedures were performed using SAS Software 9.4 (SAS Institute, Cary, NC).

RESULTS

Sample Characteristics

Among this nationally representative sample, average age was 16.0 years, 49.0% were male, 74.2% were white, and 16.7% were Hispanic. The largest proportion of respondents were from the southern United States (36.7%), and 16.4% of families receive public assistance. Twenty-three percent of teens endorsed DLHS, with 62.0% of DLHS teens endorsing recent depression symptoms, 65.0% reporting a history of suicidality, and 27.0% endorsing both (Table 1).

Personal Firearm Possession

Among the sample population, 11.5% of teens endorsed personal firearm possession (ie, personal control over access to a firearm) (Table 1). In bivariate analysis, teens reporting firearm possession were more likely to be male (70.7%) and white (87.5%), with no differences by region or public assistance. Teens were equally likely to possess a firearm whether they endorsed DLHS.

Among teens reporting they personally possessed a firearm,

TABLE 1 Sociodemographic Characteristics Among Adolescent Youth (Age 14–18) With or Without Firearm Possession and With and Without On- or Off-Property Firearm Access

| | Teen Firearm Possession, % (95% CI) | | Perceived Teen Firearm Access, % (95% CI) | | Total Sample, % (95% CI) |
|------------------------------------|-------------------------------------|----------------------|---|----------------------|--------------------------|
| | Yes, 11.5 (8.7–14.3) | No, 88.5 (85.7–91.3) | Yes, 44.2 (40.2–48.2) | No, 55.8 (51.8–59.8) | |
| Teen's age, mean (SD) ^a | 16.3 (15.9–16.7) | 16.0 (15.8–16.1) | 16.2 (16.0–16.4) | 15.8 (15.7–16.0) | 16.0 (15.9–16.1) |
| Gender ^b | | | | | |
| Male | 70.7 (59.5–82) | 46.1 (41.9–50.3) | 51.5 (45.3–57.8) | 46.9 (41.7–52.1) | 49.0 (44.9–53.0) |
| Female | 25.2 (14.8–35.6) | 52.1 (47.9–56.3) | 46.3 (40.0–52.5) | 51.2 (46.0–56.4) | 49.0 (45.0–53.0) |
| Another gender ^c | 4.1 (0.0–9.9) | 1.7 (0.8–2.7) | 2.2 (0.5–3.9) | 1.9 (0.5–3.2) | 2.0 (1.0–3.1) |
| Race ^b | | | | | |
| White | 87.5 (79.5–95.4) | 72.5 (68.5–76.5) | 74.4 (68.8–79.9) | 74.1 (69.2–79.0) | 74.2 (70.5–77.9) |
| Black | 1.3 (0.0–3.4) | 12.1 (8.9–15.2) | 9.1 (5.3–12.9) | 12.2 (8.1–16.2) | 10.8 (8–13.7) |
| Multiracial | 2.8 (0.4–5.2) | 10.2 (7.7–12.8) | 9.9 (6.1–13.6) | 9.0 (6.2–11.8) | 9.4 (7.1–11.6) |
| Other ^d | 8.5 (1.1–15.9) | 5.2 (3.2–7.2) | 6.7 (3.4–9.9) | 4.7 (2.3–7.1) | 5.6 (3.6–7.5) |
| Ethnicity | | | | | |
| Hispanic | 10.2 (1.8–18.5) | 17.6 (14.1–21) | 15.0 (10.2–19.7) | 18.1 (13.8–22.5) | 16.7 (13.5–19.9) |
| Region | | | | | |
| Northeast | 15.3 (4.7–26.0) | 17.0 (13.9–20.2) | 16.8 (11.9–21.7) | 16.9 (13–20.7) | 16.8 (13.8–19.9) |
| Midwest | 25.3 (14.0–36.7) | 20.1 (16.9–23.3) | 21.8 (14.8–23.8) | 21.8 (17.5–26.1) | 20.7 (17.6–23.8) |
| South | 37.6 (25.2–50.0) | 36.5 (32.4–40.7) | 41.6 (35.4–47.9) | 32.7 (27.9–37.6) | 36.7 (32.8–40.6) |
| West | 21.8 (11.8–31.7) | 26.4 (22.6–30.1) | 22.3 (17.1–27.5) | 28.6 (23.8–33.4) | 25.8 (22.3–29.3) |
| Public assistance | 9.8 (3.1–16.5) | 17.3 (13.8–20.7) | 14.0 (9.6–18.4) | 18.3 (13.8–22.8) | 16.4 (13.2–19.6) |
| DLHS ^a | 19.6 (8.9–30.2) | 23 (19.7–26.4) | 26.5 (21.2–31.9) | 19.6 (15.8–23.3) | 22.6 (19.4–25.8) |

All results calculated using the weighted sample. Unweighted $n = 1914$, weighted $n = 2003$.

^a χ^2 /comparison of means test P value $< .05$ for teen firearm access.

^b χ^2 /comparison of means test P value $< .05$ for teen firearm possession.

^c Another gender includes trans, genderqueer/gender nonconforming, and other identity genders.

^d Other race includes Native Hawaiian/Pacific Islander, American Indian/Alaskan Native, Asian American, Middle Eastern/North African, and unknown/other.

most acquired the firearm as a gift (91.1%), with a smaller proportion buying or trading something for it (13.5%). Teens who endorsed DLHS were more likely to buy or trade something to acquire the firearm and less likely to receive it as a gift compared with those who did not endorse DLHS (Table 2).

The source of firearm acquisition was overwhelmingly from family members (87.0%), with a smaller proportion obtaining them from friends (0.3%), online sellers (3.8%), brick-and-mortar stores (12.1%), trade or gun shows (3.5%), or another source (0.6%). There were no differences in the source of firearm acquisition among youth endorsing DLHS and those not endorsing DLHS (Table 2).

Perceived Firearm Access

Among teens in our sample, 44.2% indicated that they would be able to access a firearm (Table 1), and 20.2% thought they could access it

in < 5 minutes. Among teens who reported not having a household firearm, 18.1% (95% CI, 15.7–20.5) reported that they perceived they had access to an off-property firearm source.

Teens with DLHS had increased perceived access as compared with their peers. There were no other differences in perceived firearm access by sociodemographic characteristics, and no difference in perceived on- or off-property access and the relationship to DLHS when examined separately in subanalyses. For those reporting firearm access, 67.5% (CI, 61.6–73.4) of teens reported they could access a firearm from their household or surrounding property, 54.9% (CI, 48.6–61.1) reported they could access a firearm from an off-property location, and 22.4% (CI, 17.2–27.6) reported they would be able to access a firearm from either an on- or off-property location.

Among those indicating they could access an off-property firearm, the most common source was to buy or borrow the gun from a friend or peer (50.6%), followed by borrowing or buying the firearm from a family member (38.5%). Less frequently, teens felt they could purchase a firearm from a brick-and-mortar store, an online seller, a trade or gun show or a pawn shop, or that they could access a firearm without permission. DLHS teens were more likely to perceive off-property access from an online seller, a trade show, or a pawnshop compared with non-DLHS teens (Table 3).

Multivariable Analyses

Teens with DLHS were more likely to perceive access to a firearm than those without DLHS (odds ratio, 1.56; CI, 1.07–2.28) (Table 4). We also separately examined the association of depression and suicidality with firearm access. Notably, teens with depression remained more likely to perceive themselves as having firearm

TABLE 2 Firearm Ownership Characteristics Among a Nationally Representative Sample of Youth (Age 14–18) Endorsing Personal Firearm Ownership With and Without a History of Recent Depression (ie, Past 2 Weeks) or a Lifetime History of Suicidality

| | DLHS, % (95% CI) 19.6 (8.9–30.2) | Non-DLHS, % (95% CI) 80.4 (69.8–91.1) | Total Sample, % (95% CI) | OR (95% CI) ^b |
|---|--|---|-----------------------------|--------------------------|
| Method firearm obtained ^a | | | | |
| As a gift | 66.9 (34.7–99.0) | 97.0 (94.1–99.9) | 91.1 (83.0–99.3) | 0.06 (0.0–0.4) |
| Bought/traded for it | 34.3 (2.3–66.3) | 8.5 (3.3–13.7) | 13.5 (4.8–22.2) | 5.66 (1.2–27.4) |
| Other | 0.8 (0.0–2) | 1.5 (0.0–3.0) | 1.3 (0.1–2.6) | 0.54 (0.1–3.5) |
| From whom firearm was obtained ^a | | | | |
| Family member | 67.3 (35.1–99.5) | 91.8 (84.1–99.5) | 87.0 (77.3–96.6) | 0.18 (0.0–1.1) |
| Friend or peer | 1.6 (0.0–3.9) | 0.0 (0.0–0.0) | 0.3 (0.0–0.7) | N/A |
| Online seller | 15.2 (0.0–41.9) | 1.0 (0.0–3.0) | 3.8 (0.0–9.7) | 17.78 (1.0–319.8) |
| Store | 18.2 (0.0–44.8) | 10.6 (4.9–16.3) | 12.1 (4.9–19.2) | 1.89 (0.3–12.5) |
| Trade or gun show | 0.0 (0.0–0.0) | 4.3 (0.0–11.5) | 3.5 (0.0–9.3) | N/A |
| Other | 0.4 (0.0–1.2) | 0.6 (0.0–1.6) | 0.6 (0.0–1.4) | 0.61 (0.1–8.1) |

All results calculated using the weighted sample and are among the sample who personally own a firearm. Unweighted $n = 158$, weighted $n = 192$. N/A, not applicable; OR, odds ratio.

^a Indicates a check-all-that-apply response.

^b Odds ratios are calculated from bivariate logistic regressions. Outcome reference groups are those who did not obtain a firearm in that fashion.

access than those without depression (odds ratio, 1.68; CI, 1.04–2.73), whereas there was no association found for teen-perceived firearm access with suicidality. We did not find an association between DLHS and personal firearm possession.

DISCUSSION

Results from our nationally representative sample demonstrate that, despite the increased risk of suicide that exists among youth

experiencing DLHS,^{20–23} such youth have higher levels of perceived firearm access and comparable levels of personal firearm possession to youth not experiencing DLHS. This is particularly concerning considering that suicide continues to be the second leading cause of death among adolescents,¹ and firearm suicide rates among adolescents have increased by nearly 50% over the past 10 years.¹ Findings highlight opportunities to reduce firearm access among teens, particularly those with DLHS.

TABLE 3 Characteristics of Perceived Points of Off-Property Firearm Access Among a Nationally Representative Sample of Youth (Age 14–18) Endorsing Perceived Firearm Access, With and Without a History of Recent Depression (ie, Past 2 Weeks) or a Lifetime History of Suicidality

| | DLHS, % (95% CI) 27.3 (20.1–34.4) | Non-DLHS, % (95% CI) 72.7 (65.6–79.9) | Total Sample, % (95% CI) | OR (95% CI) ^a |
|----------------------------------|---|---|-----------------------------|--------------------------|
| Buy/borrow from a family member | 33.2 (19.4–47.0) | 40.4 (30.4–50.5) | 38.5 (30.2–46.8) | 0.7 (0.3–1.6) |
| Buy/borrow from a friend or peer | 60.5 (46.8–74.2) | 46.9 (36.7–57) | 50.6 (42.1–59.1) | 1.7 (0.9–3.5) |
| Buy from an online seller | 36.6 (22.4–50.9) | 16.4 (9.9–23.0) | 21.9 (15.5–28.3) | 2.9 (1.3–6.4) |
| Buy from a street seller | 25.7 (13.1–38.3) | 17.0 (9.4–24.7) | 19.4 (12.8–26.0) | 1.7 (0.7–4.0) |
| Buy from a store | 35.8 (21.7–49.9) | 21.6 (13.8–29.4) | 25.5 (18.5–32.4) | 2.0 (0.9–4.4) |
| Buy from a trade or gun show | 26.6 (12.8–40.4) | 10.3 (4.9–15.7) | 14.7 (9.1–20.4) | 3.2 (1.3–7.9) |
| Buy from a pawnshop | 26.5 (12.7–40.3) | 7.0 (3.5–10.5) | 12.3 (7.4–17.2) | 4.8 (2.0–11.7) |
| Take without permission | 26.3 (14.1–38.5) | 18.5 (9.8–27.3) | 20.6 (13.5–27.8) | 1.6 (0.7–3.7) |
| Other | 1.7 (0.0–3.8) | 10.5 (3.2–17.9) | 8.1 (2.6–13.6) | 0.1 (0.0–0.7) |

All results calculated using the weighted sample. Unweighted $n = 382$, weighted $n = 486$. Responses are check all that apply. OR, odds ratio.

^a Odds ratios are calculated from bivariate logistic regressions. Outcome reference groups are those who did not identify the specific point of off-property access.

Our data demonstrate that nearly 12% of US teens report personally possessing a firearm. Further, just under half of US teens believe they can access a firearm, and this prevalence is even higher among teens who endorse DLHS. Given that developmental studies highlight the role of impulsivity in encouraging adolescent teen risk behaviors and teens' limitations in fully conceptualizing the potential consequences of their actions,^{24,25} unsupervised access to household firearms raises significant concerns for firearm injury outcomes across the injury spectrum. This is particularly true in light of evidence that nearly half of individuals attempt suicide within 10 to 20 minutes of their suicidal thought, a finding consistent among teenagers and young adults,^{26,27} and that the attempt is in the context of a perceived recent crisis (2 weeks) in nearly a third of firearm suicide decedents.²⁸ In 1 qualitative study, 90% of adolescents who attempted suicide did so within 3 hours of a crisis.²⁹ We also found that, among teens indicating they could gain access to a firearm, nearly 70% noted they could identify an on-property source and over half reported that they could identify an off-property source. This is in the context of evidence that locked firearm storage reduces suicide risk,³⁰ and that reducing lethal means access is an effective suicide prevention strategy.^{13,14,31} Despite this, firearms storage practices do not differ in households where there is an adolescent with elevated risk of suicide.³² This highlights an urgent need to address both unsupervised teen access to a household firearm (whether personally owned or other household firearm) and off-property firearm access. It also reinforces the importance of current professional society guidelines recommending that health care providers counsel families about safe firearm storage and reducing youth firearm access.^{30,33}

TABLE 4 Multivariate Models Examining the Relationship Between Recent Depression and/or Lifetime History of Suicidality (DLHS) and Firearm Characteristics Related to Ownership and Access, Adjusting for Sociodemographic Variables

| DLHS | aOR (95% CI) ^a | Teen FA Possession Versus No Possession | Perceived FA Access Versus No Perceived FA Access |
|------|---------------------------|---|---|
| | | 0.97 (0.47–2.00) | 1.56 (1.07–2.28) |

All results calculated with the weighted sample. aOR, adjusted odds ratio; FA, firearm. Weighted total $N = 2003$; weighted non-DLHS 77.4%, weighted DLHS 22.6%.

^a Multivariate logistic covariates include age, gender, public assistance, and region.

Our finding that nearly 1 in 5 teens perceive access to a firearm when there is none in the household further underscores the importance of universal counseling, even in the absence of household firearms. In this case, counseling should be tailored to address potential sources of off-property access.

Our findings regarding the source of firearms acquisition are novel. Among teens personally possessing firearms, they overwhelmingly acquired the firearm as a gift, largely from family members. This presents opportunities for preventative efforts to address how caregivers might maintain greater supervision over access to firearms provided as a gift to teens. Further, it is notable that teens experiencing DLHS and personally owning firearms reported a higher likelihood of acquiring the firearm by buying or trading something for it and not obtaining it as a gift. This finding is salient, because parents and family may limit access, recognizing that an increased injury risk exists in the setting of a DLHS history, but teens may be able to gain access to firearms from nonfamily sources (with or without parental approval).

Further, our findings on potential sources of off-property firearm access highlight that teens, especially those experiencing mental health issues, perceive that nontraditional sales outlets (eg, online sellers, trade/gun shows, pawnshops) may be easier locations for purchasing/acquiring firearms. Given that federal firearm laws do not permit youth aged <18 years to purchase firearms, with

some exceptions for long guns sold by unlicensed dealers,³⁴ such findings highlight the need for stricter enforcement of existing laws around firearm purchasing. They also suggest a role for extending federal laws regarding minimum purchasing age to nontraditional sources of firearm access and for all firearm types. Other potential policy approaches which address on-property access, such as child-access prevention laws, hold adults liable if a minor accesses their firearm without supervision and may be effective at reducing unintentional deaths (aged 0–14 years)^{35–37} and suicides^{36,38} among children and adolescents if implemented and enforced.

Findings have implications for adolescent health care providers. They highlight the need for health care providers to provide counseling to parents and teens around unsupervised firearm access, including potential on- and off-property access points. For teens, this is well aligned with other preventative counseling routinely recommended for adolescent risk behaviors (ie, sexual behaviors, drug use).^{39–42} Previous work surrounding adolescent risk-taking behaviors supports this approach, suggesting that best practice counseling methods should approach these discussions using nonjudgmental, patient-centered care principles focused on harm-reduction.^{43–46} Thus far, counseling has not been routinely adopted by health care providers, who cite barriers such as time constraints, discomfort with counseling around certain aspects of lethal means and firearm safety, and inadequate self-efficacy for conducting such

counseling.^{47,48} Given that <20% of US medical schools include curricula on providing such counseling, adding additional educational modules for both physicians in training and those currently in practice may help improve both the rate of and efficacy of firearm safety counseling among health care providers.⁴⁹

Future research should examine whether principles that have successfully decreased motor vehicle collisions in young adults could be applied to teen firearm safety.⁵⁰ Similar to graduated drivers licenses and mandatory behind-the-wheel training, health care providers may suggest establishing supervision or access rules for firearms, and developing a stepwise plan that recognizes key developmental stages, their own personal risk factors, and their previous training about firearm safety is sensible. Regardless, ensuring that conversations proceed in a respectful manner, using a shared decision-making approach that focuses on harm reduction and safety, may increase adoption by caregivers.

Youth with mental health concerns pose a unique challenge, given evidence that the presence of firearms in the household is an independent risk factor for suicide and our findings that there are no differences in firearm possession rates and increased access among teens with DLHS.^{15,51,52} Providers should identify higher-risk youth, whether using clinical screening tools for depression and suicidal ideation or a nonstructured history. Careful attention should be given to sexual minority youth (trans, genderqueer/gender nonconforming and other identity genders) who, consistent with previous literature,^{53,54} was found to have a substantially increased risk of DLHS in our study. Because caregivers often underestimate their child's risk of suicide,⁵⁵ discussing their child's specific risk factors may help build

rapport with the family, setting the tone for a nonjudgmental conversation before counseling. Providers should counsel caregivers to recognize escalating signs of mental health crisis and encourage caregivers to either ensure teens have no means of access to firearms in the home, or temporarily remove them, during high-risk periods. Consistent with previous studies, there was no association found between teen firearm access and suicidality when depression and suicidality were examined separately.⁵⁶ This finding may be skewed because it does not include those who had increased access and completed suicide. Further, we still demonstrate firearm access that is at least equal to their non-DLHS peers, highlighting the need to counsel around lethal means safety.

Our study findings should be interpreted in the context of several limitations. First, the cross-sectional nature precludes causal attribution. Second, the use of self-report survey measures, including perceived firearm access, is a potential limitation that may underestimate true firearm access because of desirability bias. However, previous studies have demonstrated that the use of self-report items has high reliability and validity for assessing risk behaviors, including firearm behaviors when confidentiality and privacy are assured, as was done in our study.⁵⁷⁻⁵⁹ If this

were an issue, our findings are most likely underestimating the true problem. Additionally, if questions were seen as intrusive, participants may be less likely to disclose and our findings could underestimate access⁵⁷; however, rates of missingness for firearm variables were low and comparable to missingness for other variables. Third, perception of access is used as a proxy for potential access, which may not accurately reflect the ability of a teen to obtain a firearm. Fourth, it is important to note that our use of the single suicidality item from the PHQ-9 as a measure of lifetime suicidality, while commonly used as a screening tool in clinical settings, may not adequately identify suicide risk or ideation in all subgroup populations.⁶⁰ Our finding that 23% of teens endorse DLHS is slightly lower than other national surveys during a similar time period finding that 31.1% of youth experienced poor mental health during the preceding month and nearly 20% had seriously considered suicide over the last year.⁶¹ These findings are likely reflective of differences in measures used between studies. Regardless, such findings suggest that, if anything, our findings are underestimating the potential magnitude of the problem. Finally, though our sample is nationally representative, we did not examine

state-specific access or possession and the relation to local laws to understand the impact of existing state firearm regulations.

CONCLUSIONS

Our study provides a comprehensive analysis of teen firearm access, specifically among teens at elevated suicide risk. Data find that youth at increased risk for suicide have elevated rates of perceived access and comparable rates of personal firearm possession to youth without a history of depression or suicidality. Further, youth with DLHS have unique perceptions regarding where they may be able to access firearms, and potentially different sources of access for firearms they have possession of within the household. These findings highlight additional opportunities for prevention, both through individual-level health care provider counseling of parents and teens, as well as policy-level interventions that limit teen access to firearms.

ABBREVIATIONS

CI: confidence interval
DLHS: depression and/or lifetime history of suicidality
PHQ: patient health questionnaire

Accepted for publication Feb 27, 2023

Address correspondence to Maya Haasz, MD, Section of Pediatric Emergency Medicine, University of Colorado School of Medicine, Children's Hospital Colorado, 13123 East 16th Ave, Box 251, Aurora, CO 80045. E-mail: maya.haasz@childrenscolorado.org

PEDIATRICS (ISSN Numbers: Print, 0031-4005; Online, 1098-4275).

Copyright © 2023 by the American Academy of Pediatrics

FUNDING: Funded by the National Institutes of Health/National Institute of Child Health and Human Development, under award #5R24HD08714903. Research reported in this publication was also supported by the National Institutes of Health/National Institute of Child Health, under award #T32HD108054. The funders had no role in the design or conduct of this study. Findings in this article do not represent the views of the National Institutes of Health/National Institute of Child Health and Human Development.

CONFLICT OF INTEREST DISCLOSURES: The authors have indicated they have no conflicts of interest relevant to this article to disclose.

REFERENCES

- Centers for Disease Control and Prevention. WISQARS injury data. Available at: <https://www.cdc.gov/injury/wisqars/index.html>. Accessed May 9, 2022
- Curtin S. National Vital Statistics Reports. State suicide rates among adolescents and young adults aged 10–24: United States, 2000–2018. Available at: <https://www.cdc.gov/nchs/data/nvsr/nvsr69/NVSR-69-11-508.pdf>. Accessed July 10, 2021
- Curtin SC, Heron M, Miniño AM, Warner M. Recent increases in injury mortality among children and adolescents aged 10–19 Years in the United States: 1999–2016. *Natl Vital Stat Rep*. 2018; 67(4):1–16
- Elnour AA, Harrison J. Lethality of suicide methods. *Inj Prev*. 2008;14(1):39–45
- Miller M, Azrael D, Hemenway D. Household firearm ownership and suicide rates in the United States. *Epidemiology*. 2002;13(5):517–524
- Brent DA, Perper JA, Goldstein CE, et al. Risk factors for adolescent suicide. A comparison of adolescent suicide victims with suicidal inpatients. *Arch Gen Psychiatry*. 1988;45(6):581–588
- Azrael D, Cohen J, Salhi C, Miller M. Firearm storage in gun-owning households with children: results of a 2015 national survey. *J Urban Health*. 2018;95(3):295–304
- Miller M, Azrael D. Firearm storage in US households with children: findings from the 2021 national firearm survey. *JAMA Netw Open*. 2022;5(2):e2148823
- Baxley F, Miller M. Parental misperceptions about children and firearms. *Arch Pediatr Adolesc Med*. 2006;160(5):542–547
- Salhi C, Azrael D, Miller M. Parent and adolescent reports of adolescent access to household firearms in the United States. *JAMA Netw Open*. 2021; 4(3):e210989
- Swanson SA, Eyllon M, Sheu YH, Miller M. Firearm access and adolescent suicide risk: toward a clearer understanding of effect size. *Inj Prev*. 2020;27(3):264–270
- Centers for Disease Control and Prevention. Suicide prevention strategic plan FY 2020–2022. Available at: https://www.cdc.gov/suicide/pdf/SuicidePrevention_StrategicPlan-508.pdf. Accessed March 13, 2021
- Zalsman G, Hawton K, Wasserman D, et al. Suicide prevention strategies revisited: 10-year systematic review. *Lancet Psychiatry*. 2016;3(7):646–659
- Mann JJ, Apter A, Bertolote J, et al. Suicide prevention strategies: a systematic review. *JAMA*. 2005;294(16):2064–2074
- Johnson RM, Barber C, Azrael D, Clark DE, Hemenway D. Who are the owners of firearms used in adolescent suicides? *Suicide Life Threat Behav*. 2010;40(6):609–611
- Sheley JF, Wright JD. In the line of fire: youths, guns, and violence in urban America. Transaction Publishers. 1995
- Kroenke K, Spitzer RL, Williams JB. The patient health questionnaire-2: validity of a two-item depression screener. *Med Care*. 2003;41(11):1284–1292
- Johnson JG, Harris ES, Spitzer RL, Williams JB. The patient health questionnaire for adolescents: validation of an instrument for the assessment of mental disorders among adolescent primary care patients. *J Adolesc Health*. 2002;30(3):196–204
- Group TG. *Best practices for asking questions to identify transgender and other gender minority respondents on population-based surveys*. Los Angeles, CA: The Williams Institute, UCLA. 2014
- Fonseca-Pedrero E, Al-Halabí S, Pérez-Albéniz A, Debbané M. Risk and protective factors in adolescent suicidal behavior: a network analysis. *Int J Environ Res Public Health*. 2022;19(3):1784
- Poudel A, Lamichhane A, Mağar KR, Khanal GP. Nonsuicidal self-injury and suicidal behavior among adolescents: co-occurrence and associated risk factors. *BMC Psychiatry*. 2022;22(1):96
- Cybulski L, Ashcroft DM, Carr MJ, et al. Risk factors for nonfatal self-harm and suicide among adolescents: two nested case-control studies conducted in the UK Clinical Practice Research Datalink. *J Child Psychol Psychiatry*. 2022;63(9): 1078–1088
- Brent DA, Perper JA, Moritz G, et al. Psychiatric risk factors for adolescent suicide: a case-control study. *J Am Acad Child Adolesc Psychiatry*. 1993; 32(3):521–529
- Bonar EE, Souweidane MA, Blow FC, et al. High-intensity drinking among adolescent and emerging adult risky drinkers. *Subst Abuse*. 2022;43(1):713–721
- Nawi AM, Ismail R, Ibrahim F, et al. Risk and protective factors of drug abuse among adolescents: a systematic review. *BMC Public Health*. 2021;21(1): 2088
- Deisenhammer EA, Ing CM, Strauss R, Kemmler G, Hinterhuber H, Weiss EM. The duration of the suicidal process: how much time is left for intervention between consideration and accomplishment of a suicide attempt? *J Clin Psychiatry*. 2009;70(1):19–24
- Simon OR, Swann AC, Powell KE, Potter LB, Kresnow MJ, O'Carroll PW. Characteristics of impulsive suicide attempts and attempters. *Suicide Life Threat Behav*. 2001;32(1 Suppl):49–59
- Choi NG, DiNitto DM, Marti CN. Youth firearm suicide: precipitating/risk factors and gun access. *Child Youth Serv Rev*. 2017;83:9–16
- O'Brien KHM, Nicolopoulos A, Almeida J, Aguinaldo LD, Rosen RK. Why adolescents attempt suicide: a qualitative study of the transition from ideation to action. *Arch Suicide Res*. 2021;25(2): 269–286
- 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
- Shelef L, Tatsa-Laur L, Derazne E, Mann JJ, Fruchter E. An effective suicide prevention program in the Israeli Defense Forces: a cohort study. *Eur Psychiatry*. 2016;31:37–43
- 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
- Committee on Injury, Violence, and Poison Prevention. Policy statement—role of the pediatrician in youth violence prevention. *Pediatrics*. 2009; 124(1):393–402
- Giffords Law Center. Who can have a gun: minimum age to purchase & possess. Available at: <https://giffords.org/lawcenter/gun-laws/policy-areas/who-can-have-a-gun/minimum-age/#:~:>

- text=Minimum%20Age%20for%20Gun%20Possession,guns%20or%20long%20gun%20ammunition. Accessed July 9, 2021
35. Azad HA, Monuteaux MC, Rees CA, et al. Child access prevention firearm laws and firearm fatalities among children aged 0 to 14 years, 1991–2016. *JAMA Pediatr*. 2020;174(5):463–469
 36. Hamilton EC, Miller CC III, Cox CS Jr, Lally KP, Austin MT. Variability of child access prevention laws and pediatric firearm injuries. *J Trauma Acute Care Surg*. 2018;84(4):613–619
 37. Schell TL, Cefalu M, Griffin BA, Smart R, Morral AR. Changes in firearm mortality following the implementation of state laws regulating firearm access and use. *Proc Natl Acad Sci USA*. 2020;117(26):14906–14910
 38. Kivisto AJ, Kivisto KL, Gurnell E, Phalen P, Ray B. Adolescent suicide, household firearm ownership, and the effects of child access prevention laws. *J Am Acad Child Adolesc Psychiatry*. 2021; 60(9):1096–1104
 39. Raidoo S, Kaneshiro B. Contraception counseling for adolescents. *Curr Opin Obstet Gynecol*. 2017;29(5):310–315
 40. Krist AH, Davidson KW, Mangione CM, et al. US Preventive Services Task Force. Behavioral counseling interventions to prevent sexually transmitted infections: US Preventive Services Task Force recommendation statement. *JAMA*. 2020;324(7):674–681
 41. Hum AM, Robinson LA, Jackson AA, Ali KS. Physician communication regarding smoking and adolescent tobacco use. *Pediatrics*. 2011;127(6):e1368–e1374
 42. Owens DK, Davidson KW, Krist AH, et al. US Preventive Services Task Force. Primary care interventions for prevention and cessation of tobacco use in children and adolescents: US Preventive Services Task Force recommendation statement. *JAMA*. 2020;323(16):1590–1598
 43. Kadivar H, Thompson L, Wegman M, et al. Adolescent views on comprehensive health risk assessment and counseling: assessing gender differences. *J Adolesc Health*. 2014;55(1):24–32
 44. Coupey SM. Interviewing adolescents. *Pediatr Clin North Am*. 1997;44(6): 1349–1364
 45. Winer JM, Yule AM, Hadland SE, Bagley SM. Addressing adolescent substance use with a public health prevention framework: the case for harm reduction. *Ann Med*. 2022;54(1):2123–2136
 46. Haasz M, Boggs JM, Beidas RS, Betz ME. Firearms, physicians, families, and kids: finding words that work. *J Pediatr*. 2022;247:133–137
 47. Thai JN, Saghir HA, Pokhrel P, Post RE. Perceptions and experiences of family physicians regarding firearm safety counseling. *Fam Med*. 2021;53(3):181–188
 48. Sale E, Hendricks M, Weil V, Miller C, Perkins S, McCudden S. Counseling on access to lethal means (CALM): an evaluation of a suicide prevention means restriction training program for mental health providers. *Community Ment Health J*. 2018;54(3):293–301
 49. Barron A, Hargarten S, Webb T. Gun violence education in medical school: a call to action. *Teach Learn Med*. 2022; 34(3):295–300
 50. Walshe EA, Romer D, Wyner AJ, et al. Licensing examination and crash outcomes postlicensure in young drivers. *JAMA Netw Open*. 2022;5(4):e228780
 51. 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
 52. Anglemeyer 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
 53. Stone DM, Luo F, Ouyang L, Lippy C, Hertz MF, Crosby AE. Sexual orientation and suicide ideation, plans, attempts, and medically serious attempts: evidence from local Youth Risk Behavior Surveys, 2001–2009. *Am J Public Health*. 2014;104(2):262–271
 54. D’Augelli AR, Hershberger SL, Pilkington NW. Suicidality patterns and sexual orientation-related factors among lesbian, gay, and bisexual youths. *Suicide Life Threat Behav*. 2001;31(3):250–264
 55. Hoskins K, Roy Paladhi U, McDonald C, Bутtenheim A. Applying behavioral economics to enhance safe firearm storage. *Pediatrics*. 2020;145(3):e20192268
 56. 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
 57. Tourangeau R, Yan T. Sensitive questions in surveys. *Psychol Bull*. 2007; 133(5):859–883
 58. Turner CF, Ku L, Rogers SM, Lindberg LD, Pleck JH, Sonenstein FL. Adolescent sexual behavior, drug use, and violence: increased reporting with computer survey technology. *Science*. 1998; 280(5365):867–873
 59. Milton AC, Ellis LA, Davenport TA, Burns JM, Hickie IB. Comparison of self-reported telephone interviewing and Web-based survey responses: findings from the second Australian Young and Well National Survey. *JMIR Ment Health*. 2017;4(3):e37
 60. Na PJ, Yaramala SR, Kim JA, et al. The PHQ-9 Item 9 based screening for suicide risk: a validation study of the Patient Health Questionnaire (PHQ)-9 Item 9 with the Columbia Suicide Severity Rating Scale (C-SSRS). *J Affect Disord*. 2018;232:34–40
 61. Jones SEEK, Ethier KA, Hertz M, et al. Mental health, suicidality, and connectedness among high school students during the COVID-19 pandemic—adolescent behaviors and experiences survey, United States, January–June 2021. *MMWR Suppl*. 2022;71(3):16–21