

Locked, Loaded, and Ready for School: The Association of Safety Concerns With Weapon-carrying Behavior Among Adolescents in the United States

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Abstract

There is limited, if any, prior research exploring the potential link between adolescents' safety concerns and their predisposition to possess weapons has been limited. This study aimed to examine the relationship between high school students' perceived lack of safety and their weapons carrying behavior in a multiyear nationally representative sample of high school students. Information on self-reported weapons carrying in past month and gun carrying in past year, perceived lack of safety at school or during commute, being bullied and/or threatened, involvement in physical fights, and demographic characteristics were retrieved from Youth Risk Behavior Surveillance Survey data for 1991-2017. Generalized linear mixed models were used to address data clustering by survey year. Sampling design and sample weights were accounted for. Of a total number of 195,280 respondents with valid responses during 1991-2017, 18%, 7%, and 5%, respectively, carried weapon(s) in general, weapon(s) to school, and gun. On an average, 5% skipped school due to safety concerns. Missing ≥ 2 school

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days was associated with weapon (adjusted odds ratio [AOR]: 2.25; 95% confidence interval [CI]: 1.94 -2.61) and gun (AOR: 3.18; 95% CI: 1.81 -5.58) possessions, as well as weapons possession in school (AOR: 2.47; 95% CI: 1.96 -3.12). Experiences of weapons-induced injury(ies) or threat(s), and involvement in physical fights were other significant covariates in adjusted analyses. Compared with non-Hispanic whites, students of other racial/ethnic groups had significantly lower odds of possessing weapons. Perceived lack of safety emerged as a potential determinant of weapon carrying, a behavior with far-reaching public health concerns. While future research looking into the psychological motivations of possessing weapons is recommended, our findings offer a unique opportunity to address the crucial problems of school absenteeism induced by experiences of aggression and fears for safety as well as preempt the consequences of weapons-possession by adolescents.

Keywords

bullying, violence exposure, youth violence

Introduction

More than 15 million students—approximately 4.6% of the total population of the United States (U.S.)—attend grades 9 to 12 (National Center for Education Statistics [NCES], 2020), of whom 3.2 million are expected to graduate high school during 2020–21 (NCES, 2020). High-school years mark one of the most critical formative phases in adolescents' lives as they prepare to make crucial transitions in their lives and career (Rich & Schachter, 2012). Consequently, a positive school climate, which refer to conditions that support learning as well as physical and emotional safety, connectedness, and engagement, physical and emotional—is the sine qua non for a productive school experience (U.S. Department of Education, Office of Safe and Healthy Students, 2016).

Despite the fundamental right of students to feel safe, secure, and supported in their schools, parents (Jones, 2018) and children (Graf, 2018) have often expressed concerns about feeling safe at school. Graf (2018) reported that 57% of teenagers surveyed for a Pew Research Center study were worried about the possibility of a shooting in their school premises. Another survey, conducted among ACT-tested students revealed that between 9% and 10% did not feel safe or welcome at school and 3% felt unsafe during their commute between home and school (Croft et al., 2019). During the 2015–2016 school year, about 11,700 instances of physical attack or fight with a weapon were reported, with nearly 230 schools (0.2% of all schools) reporting at least one instance of school-related shooting (U.S. Department of

Education, Office for Civil Rights, 2018 [revised 2019]). More than a hundred schools had a school-related homicide involving a student, faculty, or staff (U.S. Department of Education, Office for Civil Rights, 2018 [revised 2019]). Physical fights, instances of threats and/or injuries, and other common forms of school violence experienced at, or during commute to or from the school premises and/or an off-campus school event, negatively affect students, schools, and the community (Centers for Disease Control and Prevention [CDC], 2019).

A particular cause for concern is the propensity of a small—but not negligible—proportion of students to carry weapons such as guns, knives, and clubs at their schools and elsewhere. According to a recent report, nearly 16% of students in grades 9 through 12 in the U.S. self-reportedly carried a weapon with them over the previous month, while 4% carried a weapon at school in 2017 (Musu et al., 2019). Although possession of weapons has been recognized as one of the risk factors behind perpetration of violence, substance use, and other delinquent behaviors among adolescents including high school students (DuRant et al., 1995; Emmert et al., 2018), the factors leading to or associated with the practice of carrying weapons—particularly at an educational institution—have not been explored enough. This is despite the fact that results from prior studies lend support to the maxim that violence engenders more violence (Averdijk et al., 2016; Capaldi et al., 2018).

The scant research on adolescent experiences of violence, threats, and insecurity in the context of weapons carrying has generally been limited to examining bullying victims' experiences (Simckes et al., 2017; Steiner & Rasberry, 2015). Although the implications of bullying on the victims' behavior is of paramount importance, there have been very few, if any, attempts to examine the relationship between students' perceived lack of safety and their likelihood of possessing weapons. This could be crucial especially given that violence and aggression often manifest in subtle or "invisible" ways (Garandeanu & Cillessen, 2006), thereby leaving the victims with a sense of fear and lack of safety. Indeed, Steiner and Rasberry (2015) found that adolescent students from the U.S. who experienced in-person or electronic bullying were more likely than those that were not bullied, to miss school due to safety concerns. In such circumstances, it is possible that a high school student's likelihood of missing schools due to safety concerns can act as a marker or an indicator of their feelings of insecurity and vulnerability and prompt a tendency to carry weapons. Prior research on aggregated 2011 and 2013 U.S. data revealed that after controlling for sex, age, race, income, and school type (public or private), adolescents aged 12–18 years old who experienced traditional and/or cyberbullying were two to six times more likely to have access to a loaded gun without adult permission, compared with their nonbullied counterparts

(Simckes et al., 2017). The same study observed that while nonbullied males (3.6%) were significantly more likely than nonbullied females (1.8%) to have access to loaded gun, there was no sex difference among victims of bullying in terms of carrying a loaded gun (Simckes et al., 2017). While the potential factors behind this attenuation of sex-difference in access to firearms—a behavior generally more common males (Simonetti et al., 2015)—among bullied adolescents were not examined, their instinct to self-defense and/or create doubts in the perpetrators' minds might have played a role. The aforementioned studies did not take into account students' safety concerns, nor did they examine the possession of weapons in general. To the best of the authors' knowledge, prior research has not explored the potential link between feeling unsafe and weapons carrying among high-school students.

It is also pertinent to examine whether propensity to possess weapons, especially at schools, vary by race/ethnicity and the role of perceived lack of safety in this context. Prior research has revealed a higher likelihood of minority students being punished and/or suspended, in general, compared with non-Hispanic white students (Kupchik & Ellis, 2008; Morris & Perry, 2016). Although these findings were not specific to weapons-carrying, it is intriguing that stereotypical perceptions of minority youth as perpetrators of violence persist despite high profile incidents of shootings and/or other acts of violence perpetrated by non-Hispanic White male youth. One such incident occurred on August 25, 2020, when 17-year-old Kyle Rittenhouse shot two people dead and injured a third, at an event organized to protest against the shooting of Jacob Blake by police in Kenosha, Wisconsin (Karimi, 2020). Indeed, while the long overdue much-needed national focus on the dangerous, often lethal, consequences of systemic racism is encouraging, it is equally important to examine the extent to which popular perceptions of racial/ethnic differences in potentially dangerous behavior such as carrying of weapons are rooted in facts.

This study aims to examine the relationship between high school students' perceived lack of safety and their weapon-carrying behavior in a nationally representative sample of Youth Risk Behavior Survey (YRBS) responders. The hypothesis guiding this study is that high school students who have missed one or more days of school owing to safety concerns will be more likely to report carrying weapons at schools as well as at other places. Furthermore, this relationship will be attenuated but will not disappear after adjusting for their experiences of bullying, threats or violence, and involvement in physical fights. On the other hand, racial/ethnic differences in possessions of weapons will be accentuated and/or revealed after adjusting for other variables.

Methods

Data Source and Participants

The data used for this study came from 1991 to 2017 YRBS. The YRBS monitors key health behaviors such as unsafe practices and violence, sexual behaviors, substance use, unhealthy dietary practices, and inadequate physical activity, all of which contribute to the leading causes of death, disability, and social problems among adolescents and young adults in the U.S. Representative samples of students in ninth through twelfth grades in public and private school are surveyed nationwide biennially. The combined YRBS dataset that includes national, state and large urban school district data from selected surveys from 1991 and 2017 was used for this analysis.

Measures

Outcome variables.

The main outcome variables of interest investigated in this study included weapon carrying behavior, weapon carrying on school property, and gun carrying behavior. Weapon carrying behavior was measured based on response to the question “During the past 30 days, on how many days did you carry a weapon such as a gun, knife, or club?” Weapon carrying on school property was measured based on response to the question “During the past 30 days, on how many days did you carry a weapon such as a gun, knife, or club on school property?” Information on weapons carrying was available for all the years of the survey, whereas weapons carrying onto school premises was asked 1993 onwards. Gun carrying was measured based on response to the question “During the past 12 months, on how many days did you carry a gun? (Do not count the days when you carried a gun only for hunting or for a sport, such as target shooting.)” For each of the aforementioned questions, respondents selected the most appropriate option from 0, 1, 2 or 3, 4 or 5, or ≥ 6 day(s). For the purpose of this study, respondents were categorized as those who carried weapon(s) at least one day within the past 30 days and those that did not carry weapon(s) within the past 30 days. Respondents were also categorized into those who carried weapon(s) on school property on ≥ 1 day(s) within the past 30 days and those that did not carry weapon(s) to school within the past 30 days. Furthermore, respondents were grouped based on whether they carried a gun on ≥ 1 day within the past 12 months and those who did not carry a gun within the same period. Gun carrying was specifically available only from YRBSS 2017 responses.

Independent variable.

Perception of safety was the main independent variable and was assessed based on the question, "During the past 30 days, on how many days did you not go to school because you felt you would be unsafe at school or on your way to or from school?" with response options 0, 1, 2 or 3, 4 or 5, and ≥ 6 day(s). A preliminary examination of the distribution of missed school days because of perceived lack of safety revealed that the number of respondents who missed a single day was comparable with the cumulative total number of students who missed school two or more days. Therefore, for the purpose of this study, respondents were classified into those who did not miss school within the past 30 days, those that missed school once, and those who missed school twice or more often because of perceived lack of safety. Information on perception of safety were available 1993 onwards.

Covariates.

Covariates examined in this study included experiences of weapon-induced injuries/threats at school, involvement in physical fight, and being a victim of bullying at school and/or electronically. Experiences of weapons-induced injuries/threats at school was measured based on the question "During the past 12 months, how many times has someone threatened or injured you with a weapon such as a gun, knife, or club on school property?" with the following response options: 0, 1, 2 or 3, 4 or 5, 6 or 7, 8 or 9, 10 or 11, and ≥ 12 time[s]). For this study, respondents were grouped into those who did not have such experience, those who experienced only once, and those who experienced on two or more occasions. Those who were injured/threatened with a weapon on school premises two or more times were all grouped together to simplify the analyses and because individual group sizes were small. Physical fight in general was measured based on the question "During the past 12 months, how many times were you in a physical fight?" with the following response options: 0, 1, 2 or 3, 4 or 5, 6 or 7, 8 or 9, 10 or 11, and ≥ 12 time[s]). Respondents were categorized into those not involved, those involved once, and those involved two or more times, as relatively few respondents reported involvement in physical fight on two or more occasions. Involvement in physical fight at school was measured based on the question, "During the past 12 months, how many times were you in a physical fight on school property?" with the following response options: 0, 1, 2 or 3, 4 or 5, 6 or 7, 8 or 9, 10 or 11, and ≥ 12 time[s]). Respondents were categorized into those not involved, those involved once, and those involved two or more times, as relatively few respondents reported involvement in physical fight on school property on two or more occasions. Victimization to bullying in school was measured based on the question "During the past 12 months, have you ever been bullied on school property?" with yes/no response) whereas

victimization to electronic bullying was measured based on the question “During the past 12 months, have you ever been electronically bullied? [Count being bullied through texting, Instagram, Facebook, or other social media.]”, with yes/no response. Of all independent variables included in this study, information on bullying at school was available 2009 onwards, whereas information on electronic bullying was available 2011 onwards.

Control variables.

The following variables were included in the analysis as control variables. The grade the students were in during the survey was coded into (9th/10th/11th/12th/ungraded, or other grade). Gender was coded into male versus female. Race/ethnicity was coded into non-Hispanic white [NHW]; non-Hispanic black or African American [NHB]; Hispanic; non-Hispanic American Indian or Alaska Native; non-Hispanic Asian; non-Hispanic Native Hawaiian, or other Pacific Islander; and non-Hispanic multiracial.

Statistical Analysis

Chi-square tests of independence were performed to examine the bivariate relationships of the independent variable and covariates with weapon carrying, weapon carrying onto school property, and gun carrying behaviors. SAS procedures that account for survey design (Proc Survey) were employed to adjust for the survey designs and sample weights. Multivariable analyses were performed using generalized linear mixed models with random intercept and the logit link function (multilevel logistic regression) to take into account clustering by year of survey. SAS 9.4 (SAS Institute, Inc., Cary, NC) was used for all analyses. This was done to account for clustering by year and to identify any change in the prevalence of these behaviors with time. SAS GLIMMIX Procedures with adaptive Gauss–Hermite quadrature method were used after adjusting for sample weights. Three separate multivariable analyses were performed with weapon carrying, weapon carrying on school property, and gun carrying as the outcome variables respectively.

All the independent variables and covariates listed previously were used in bivariate analyses as well as in the multivariable models, with the exception of involvement in physical fight. Involvement in physical fight was the only independent variable, for which the survey asked two different questions. Whereas one question asked about involvements in fighting in general, the other asked about their involvement in physical fight within school premises. Involvement in physical fight was used in analyses with weapon carrying behavior and gun carrying behavior as the respective outcomes of interest. Involvement in physical fight at school was used when weapon carrying on school property was the outcome of interest.

Results

A total number of 195,280 participants responded to the variables of interest and were included in this analysis. The sample comprised of males and females in nearly equal proportions [univariate distributions not displayed in tables]. A majority (weighted percentage 27.1%) of respondents were in grade 9, followed respectively by grades 10 (25.5%), 11 (24.0%), and 12 (23.4%). Nearly 63% were NHW, 14% NHB, 16% Hispanic, 4% non-Hispanic Asian or Native Hawaiian or other Pacific Islander, less than 1% non-Hispanic American Indian or Alaska Native, and more than 3% non-Hispanic multiracial. In terms of experiences of violence and aggression, 7.2% self-reported being injured or threatened by a weapon within their school property, and 12% reported involvement in a physical fight in their school premises at least once in the past year. About one in five adolescents (20%) were victim of school bullying and about 15% were victim of electronic bullying. More than 5% of the adolescents missed school at least once in the past month because they felt unsafe at school or during their commute. While weapons carrying behavior in general as well as weapons carrying to schools showed a significant decline over the years, the same was not true for perceived lack of safety, which showed a slight increase instead (Figure 1).

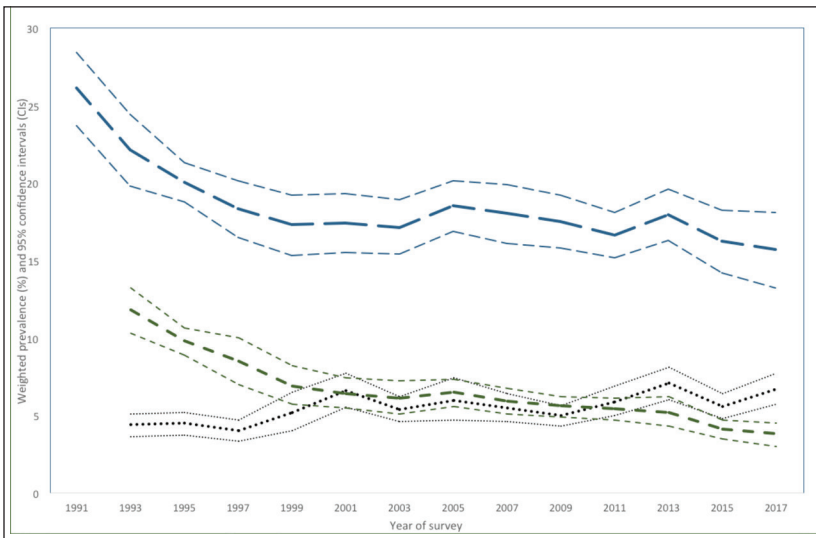


Figure 1. Weighted prevalence (%) and 95% confidence intervals (CIs) of weapons carrying (set of lines in long dash), of weapons carrying to school (set of lines in short dash), and of missing school due to perceived lack of safety (set of lines in round dots) within the past 30 days among respondents to national YRBS 1991–2017.

More than 18% of adolescents reported carrying any weapon at least once within the past 30 days (Table 1). Nearly 7% reported carrying a weapon on school property within the previous 30 days. In bivariate analysis, a significantly higher percentage of males (28.9%) than females (7.5%) carried weapons. Non-Hispanic American Indian or Alaska Natives (26.4%) had the highest proportion of weapon carrying, while Asians (9.7%) had the lowest. Weapon carrying on school property showed similar gender and racial/ethnic differences. Weapon carrying in general as well as on school property were more common among those who were injured and/or threatened with a weapon, and those who were involved in physical fights. Victims of school bullying and electronic bullying were significantly more likely to carry weapons than those who did not experience those forms of bullying in the past year. Missing school due to feeling unsafe showed a significant bivariate association with weapon carrying. Among respondents who did not miss a single day of school because of feeling unsafe in the past 30 days, 17% reported carrying any weapon, whereas 23.2% of those who missed school once in the past month carried a weapon. Nearly one out of every two students who missed school for 2 or more days due to perceived lack of safety did carry weapons in the past month. Weapon carrying on school property within the past month was reported by 6%, 10%, and 29% of respondents who missed school, never, once and on two or more occasions, respectively, due to perceived lack of safety (Table 1).

Out of 14,195 responders to 2017 YRBS —the only year for which gun-carrying data were available, nearly 5% carried a gun at least once over the past year (Table 2). Males (7.7%) were four times likely to carry a gun compared to females (1.9%). The proportion of students carrying a gun was higher among those who experienced an injury or a threat with a weapon, those who were involved in physical fight, and victims of bullying, as opposed to those who did not have those experiences respectively, whereas 4% of respondents who did not miss school owing to perceptions of lack of safety carried a gun, 22% of those who missed school 2 or more days carried a gun (Table 2).

Multivariable analyses adjusting for participants' gender, grade, race/ethnicity, missing school due to perceived lack of safety, having been injured or threatened with a weapon, involvement in physical fight, and experiences of school bullying and electronic bullying yielded results that were somewhat similar (Table 3) to the bivariate results. Males were significantly more likely to carry weapons in general (adjusted odds ratio [AOR]: 4.24; 95% confidence interval [CI]: 3.91–4.59), carry weapon on school property (AOR: 2.75; 95% CI: 2.39–3.17), and carry guns (AOR: 3.81; 95% CI: 2.61–5.55), than females. NHBs, non-Hispanic Asians, and Hispanics had significantly lower adjusted odds of carrying weapons than NHWs. Missing school due to perceived lack of safety was associated with significantly higher adjusted

Table 1. Distribution of National Youth Risk Behavior Survey (YRBS) 1991–2017 Respondents According to Weapon Carrying Behavior.

	Carried Weapon(s) Within Past 30 Days		Carried Weapon(s) to School Within Past 30 Days ^a		p Value ^d
	Yes ^b (%; 95% CI) ^c	No ^b (%; 95% CI) ^c	Yes ^b (%; 95% CI) ^c	No ^b (%; 95% CI) ^c	
Total	36,147 (18.4; 17.9–18.9)	159,133 (81.6; 81.1–82.1)	12,291 (6.6; 6.3–6.9)	175,667 (93.4; 93.1–93.7)	<.0001
Gender					
Female	8,297 (7.5; 7.1–7.9)	90,903 (92.5; 92.1–92.9)	3,242 (3.1; 2.9–3.3)	92,099 (96.9; 96.7–97.1)	<.0001
Male	27,696 (28.9; 28.1–29.7)	67,751 (71.1; 70.3–71.9)	9,049 (10.0; 9.5–10.5)	83,568 (90.0; 89.5–90.5)	<.0001
Grade					
9th	9,564 (19.6; 18.8–20.4)	38,436 (80.4; 79.6–81.2)	3,046 (6.4; 6.0–6.8)	43,534 (93.6; 93.2–94.0)	<.0001
10th	8,933 (18.5; 17.8–19.2)	38,794 (81.5; 80.8–82.2)	3,023 (6.5; 6.1–6.9)	43,030 (93.5; 93.1–93.9)	<.0001
11th	8,925 (18.2; 17.5–18.9)	40,167 (81.8; 81.1–82.5)	3,153 (6.8; 6.3–7.3)	44,389 (93.2; 92.7–93.7)	<.0001
12th	8,392 (16.7; 16.0–17.4)	41,077 (83.3; 82.6–84.0)	2,951 (6.4; 5.9–6.8)	44,464 (93.6; 93.2–94.1)	<.0001
Race/ethnicity					<.0001

(continued)

Table 1. continued

	Carried Weapon(s) Within Past 30 Days			Carried Weapon(s) to School Within Past 30 Days ^a		
	Yes ^b (%; 95% CI) ^c	No ^b (%; 95% CI) ^c	p Value ^c	Yes ^b (%; 95% CI) ^c	No ^b (%; 95% CI) ^c	p Value ^d
Non-Hispanic						
White	15,790 (18.7; 18.0–19.4)	65,102 (81.3; 80.6–82.0)		4,913 (6.4; 5.9–6.8)	72,803 (93.6; 93.2–94.1)	
Black or African American	7,626 (18.0; 17.1–19.0)	34,412 (82.0; 81.0–82.9)		2,707 (6.5; 6.0–7.0)	38,097 (93.5; 93.0–94.0)	
American Indian or Alaska Native	604 (26.4; 23.8–29.0)	1,523 (73.6; 71.0–76.2)		257 (10.6; 8.7–12.6)	1,865 (89.4; 87.4–91.3)	
Asian	668 (9.7; 8.6–10.8)	6,155 (90.3; 89.2–91.4)		277 (4.5; 3.7–5.3)	6,240 (95.5; 94.7–96.3)	
Native Hawaiian or other Pacific Islander	222 (20.0; 16.6–23.5)	941 (80.0; 76.5–83.4)		104 (9.1; 6.8–11.3)	1,108 (90.9; 88.7–93.2)	
Multiracial	1,064 (21.5; 19.5–23.6)	4,055 (78.5; 76.4–80.5)		388 (8.4; 6.8–10.0)	5,007 (91.6; 90.0–93.2)	
Hispanic	9,180 (17.6; 16.8–18.3)	43,575 (82.4; 81.7–83.2)		3,290 (6.7; 6.2–7.1)	47,393 (93.3; 92.9–93.8)	
No. of times injured/threatened with weapon in past year on school property	<.0001			<.0001		
0	26,401 (15.6; 15.1–16.2)	143,134 (84.4; 83.8–84.9)		8,620 (5.1; 4.8–5.4)	165,092 (94.9; 94.6–95.2)	
1	2,113 (33.1; 31.0–35.2)	4,069 (66.9; 64.8–69.0)		965 (15.3; 13.8–16.8)	5,445 (84.7; 83.2–86.2)	

(continued)

Table 1. continued

	Carried Weapon(s) Within Past 30 Days			Carried Weapon(s) to School Within Past 30 Days ^a		
	Yes ^b (%; 95% CI) ^c	No ^b (%; 95% CI) ^c	p Value ^c	Yes ^b (%; 95% CI) ^c	No ^b (%; 95% CI) ^c	p Value ^d
≥2	4,343 (59.1; 57.4–60.9)	2,990 (40.9; 42.6–39.1)		2,723 (34.5; 32.7–36.3)	5,017 (65.5; 63.7–67.3)	
No. of times got involved in physical fight (on school property) ^e during past year			<.0001			<.0001
0	12,673 (10.3; 9.8–10.7)	114,396 (89.7; 89.3–90.2)		7,191 (4.6; 4.3–4.8)	155,564 (95.4; 95.2–95.7)	
1	6,069 (22.4; 21.5–23.2)	21,215 (77.6; 76.8–78.5)		1,971 (13.5; 12.5–14.5)	12,877 (86.5; 85.5–87.5)	
≥2	16,054 (43.2; 42.1–44.2)	20,615 (56.8; 55.8–57.9)		2,746 (33.4; 31.7–35.0)	5,585 (66.6; 65.0–68.3)	
Bullied on school property in past year ^f			<.0001			<.0001
Yes	2,740 (21.2; 19.9–22.4)	10,040 (78.8; 77.6–80.1)		1,049 (7.5; 6.7–8.3)	12,424 (92.5; 91.7–93.3)	
No	8,667 (15.7; 14.9–16.5)	47,408 (84.3; 83.5–85.1)		2,487 (4.1; 3.8–4.4)	56,763 (95.9; 95.6–96.2)	
Electronic bullying in past year ^g			<.0001			<.0001
Yes	1,529 (19.8; 18.4–21.2)	6,019 (80.2; 78.8–81.6)		623 (7.3; 6.4–8.1)	7,506 (92.7; 91.9–93.6)	
No	7,124 (15.9; 14.9–16.9)	38,035 (84.1; 83.1–85.1)		1,929 (4.0; 3.7–4.4)	46,375 (96.0; 95.6–96.3)	

(continued)

Table 1. continued

No. of day(s) missed school because felt unsafe at or on-way to school in past 30 days ^a	Carried Weapon(s) Within Past 30 Days			Carried Weapon(s) to School Within Past 30 Days ^a			p Value ^d
	Yes ^b (%; 95% CI) ^c	No ^b (%; 95% CI) ^c	p Value ^c	Yes ^b (%; 95% CI) ^c	No ^b (%; 95% CI) ^c	p Value ^d	
0	28,895 (17.0; 16.4–17.5)	142,675 (83.0; 82.5–83.6)	<.0001	9,884 (5.9; 5.6–6.2)	164,136 (94.1; 93.8–94.4)	<.0001	
1	1,284 (23.2; 21.5–24.8)	4,383 (76.8; 75.2–78.5)		573 (10.2; 8.9–11.5)	5,274 (89.8; 88.5–91.1)		
≥2	2,670 (46.7; 44.4–48.9)	3,106 (53.3; 51.1–55.6)		1,686 (29.0; 27.0–31.1)	4,344 (71.0; 68.9–73.0)		

^aData available 1993 onwards; ^bsum of categories differ between the variables because of missing values for that variable; ^cout of row total, weighted percentage (%), and 95% confidence interval (CI); ^dp value for chi-square test of independence; ^einvolvement in physical fight was used for weapons carrying behavior; ^finvolvement in physical fight at school was used for weapons carrying at school; data available 2009 onwards; ^gdata available 2011 onwards.

Table 2. Distribution of National Youth Risk Behavior Survey (YRBS) 2017 Respondents According to Gun Carrying Behavior.

	Carried Gun At Least Once Within Past Year		p Value ^c
	Yes ^a (%; 95% CI) ^b	No ^a (%; 95% CI) ^b	
Total	728 (4.8; 4.0–5.6)	13,467 (95.2; 94.4–96.0)	
Gender			<.0001
Female	151 (1.9; 1.4–2.5)	7,107 (98.1; 97.5–98.6)	
Male	556 (7.7; 6.5–8.9)	6,266 (92.3; 91.9–93.5)	
Grade			.32
9 th	180 (4.4; 3.5–5.3)	3,601 (95.6; 94.7–96.5)	
10 th	156 (4.1; 3.1–5.1)	3,419 (95.9; 94.9–96.9)	
11 th	176 (5.0; 3.3–6.6)	3,310 (95.0; 93.4–96.7)	
12 th	188 (5.5; 4.0–7.0)	3,040 (94.5; 93.0–96.0)	
Race/ethnicity			<.01
Non-Hispanic			
White	263 (4.1; 3.1–5.1)	5,864 (95.9; 94.9–96.9)	
Black or African American	166 (6.5; 4.0–9.0)	2,557 (93.5; 91.0–96.0)	
American Indian or Alaska Native	9 (7.1; 1.2–13.0)	125 (92.9; 87.0–98.8)	
Asian	17 (2.3; 1.1–3.6)	610 (97.7; 96.4–98.9)	
Native Hawaiian or other Pacific Islander	11 (5.8; 2.0–9.7)	97 (94.1; 90.3–98.0)	
Multiracial	35 (3.8; 2.1–5.5)	751 (96.2; 94.5–97.9)	
Hispanic	192 (5.9; 4.3–7.4)	3,196 (94.1; 92.6–95.7)	

(continued)

Table 2. continued

	Carried Gun At Least Once Within Past Year		p Value ^c
	Yes ^a (%; 95% CI) ^b	No ^a (%; 95% CI) ^b	
No. of times injured/threatened with weapon on school property in past year			<.0001
0	495 (3.6; 2.9–4.4)	12,793 (96.4; 95.6–97.1)	
1	61 (14.3; 10.3–18.3)	344 (85.7; 81.7–89.7)	
≥ 2	172 (32.8; 25.4–40.1)	298 (67.2; 58.9–74.6)	
No. of times got involved in physical fight in past year			<.0001
0	173 (2.0; 1.5–2.6)	8,668 (98.0; 97.4–98.5)	
1	94 (7.4; 5.1–9.8)	1,089 (92.6; 90.2–94.9)	
≥ 2	279 (17.7; 15.1–20.4)	1,250 (82.3; 79.6–84.9)	
Bullied on school property in past year			<.0001
Yes	185 (6.5; 5.4–7.6)	2,384 (93.5; 92.4–94.6)	
No	515 (4.4; 3.6–5.2)	10,973 (95.6; 94.8–96.4)	
Electronic bullying in past year			<.0001
Yes	166 (7.1; 5.8–8.4)	1,880 (92.9; 91.6–94.2)	
No	535 (4.4; 3.5–5.3)	11,472 (95.6; 94.7–96.5)	
No. of day(s) missed school because felt unsafe at or on-way to school in past 30 days			<.0001
0	431 (4.0; 3.2–4.8)	10,439 (96.0; 95.2–96.8)	
1	45 (10.1; 5.7–14.4)	383 (89.9; 85.6–94.3)	
≥ 2	91 (21.7; 16.4–27.1)	277 (78.3; 72.9–83.6)	

^aSum of categories may differ between the variables because of missing values for that variable; ^bout of row total, weighted percentage (%), and 95% confidence interval (CI); ^cp value for chi-square test of independence.

odds of carrying a weapon and a gun (Table 3), with those who missed ≥ 2 school days in the past month having 2.25 (95% CI: 1.94–2.61), 2.47 (95% CI: 1.96–3.12) and 3.18 (95% CI: 1.81–5.58) times the odds, respectively, of carrying a weapon, carrying weapon on school property, and carrying a gun compared with those who did not miss a single day of school owing to perceived lack of safety. Being injured or threatened by a weapon and involvement in physical fights remained significant after adjusting for covariates.

Discussion

The objective of this was to examine the relationship between high school students' perceived lack of safety and their weapon-carrying behavior. We found that about 18% of adolescent high school students surveyed 1991–2017 reported carrying any weapon at least once within the past 30 days. Furthermore, nearly 7% of responders reported carrying a weapon on school property at least once within the past 30 days. Six percent (6%) of responders to 2017 YRBS reported carrying a gun at least once in the past year. Approximately 5.5% had missed at least one day within the past 30 days because they felt unsafe at school or on their way to or from school. Missing school due to a perceived lack of safety varied considerably over the years—ranging from 4.0% in 1997 to 7.1% in 2013. Additionally, we found that those who skipped school owing to perceptions of lack of safety were significantly more likely to carry weapons—overall as well as on school property—even after adjusting for grade, gender, race/ethnicity, experiences of threats and/or injuries by a weapon, involvement in physical fight, and being subject to physical bullying and cyberbullying. Experiencing injury or threats with a weapon and involvement in physical fights were other independent correlates of weapons carrying after controlling for covariates. Similar results were obtained for weapon carrying on school property and gun carrying behavior.

Our findings on the prevalence of weapons carrying is similar to previous studies (Kann et al., 2018; Musu et al., 2019). The reduction in weapons possession in general as well as at schools in particular over the years might be attributable to a higher awareness and vigilance among students, parents, teachers, and the school as well as stricter vigilance. On the other hand, under-reporting cannot be ruled out owing to greater scrutiny recently than in the past. An interesting finding of our study was the racial disparities in weapon carrying. Compared with other races, NHWs were more likely to carry a weapon including guns at school. This is in agreement with a national U.S. study that assessed the rates of handgun carrying among youth between 2002 and 2013 (Vaughn et al., 2016) that showed a significant increased trend in handgun carrying among NHWs compared with NHBs and Hispanics youth.

Table 3. Multivariable Analyses Examining Correlates of Weapon Carrying and Gun Carrying Behavior Among National Youth Risk Behavior Survey (YRBS) Respondents.

	Adjusted Odds Ratio [AOR] [95% Confidence Interval [CI]]		
	Weapon Carrying Within the Past 30 Days Among YRBS 1991–2017 Respondents	Weapon Carrying on School Within the Past 30 Days Among YRBS 1993–2017 Respondents	Gun Carrying in the Past Year Among YRBS 2017 Respondents
Gender			
Female	Ref.	Ref.	Ref.
Male	4.12 (3.85–4.41)****	2.75 (2.39–3.17)***	3.81 (2.61–5.55)****
Grade			
9th	Ref.	Ref.	Ref.
10th	1.03 (0.95–1.12)	1.17 (0.98–1.40)	0.93 (0.59–1.45)
11th	1.10 (1.01–1.20)*	1.43 (1.20–1.71)****	1.31 (0.85–2.02)
12th	1.17 (1.08–1.27)***	1.45 (1.21–1.73)****	1.57 (1.02–2.42)*
Race/ethnicity			
Non-Hispanic			
White	Ref.	Ref.	Ref.
Black or African American	0.39 (0.36–0.43)****	0.47 (0.39–0.58)****	1.15 (0.76–1.74)
American Indian or Alaska Native	0.99 (0.77–1.27)	1.34 (0.87–2.07)	0.79 (0.19–3.33)
Asian	0.29 (0.24–0.36)****	0.40 (0.25–0.62)****	0.45 (0.14–1.44)
Native Hawaiian or other Pacific Islander	0.66 (0.48–0.91)*	0.88 (0.47–1.65)	1.32 (0.31–5.62)
Multiracial	0.83 (0.73–0.94)**	1.08 (0.83–1.40)	0.85 (0.42–1.75)
Hispanic	0.54 (0.50–0.58)****	0.73 (0.63–0.84)****	1.04 (0.71–1.53)

(continued)

Table 3. continued

Adjusted Odds Ratio [AOR] (95% Confidence Interval [CI])			
	Weapon Carrying Within the Past 30 Days Among YRBSS 1991–2017 Respondents	Weapon Carrying on School Within the Past 30 Days Among YRBSS 1993–2017 Respondents	Gun Carrying in the Past Year Among YRBSS 2017 Respondents
No. of day(s) missed school because felt unsafe at or on-way to school in past 30 days			
0	Ref.		Ref.
1	1.01 (0.86–1.18)	1.15 (0.84–1.57)	1.93 (1.01–3.66) [*]
≥ 2	2.25 (1.94–2.61) ^{****}	2.47 (1.96–3.12) ^{****}	3.18 (1.81–5.58) ^{****}
No. of times got injured/threatened with weapon in past year on school property			
0	Ref.		Ref.
1	1.59 (1.37–1.84) ^{****}	2.38 (1.85–3.06) ^{****}	1.69 (0.89–3.20)
≥ 2	3.29 (2.88–7.56) ^{****}	4.67 (3.83–5.69) ^{****}	2.88 (1.71–4.88) ^{****}
No. of times got involved in physical fight (at school property) in past year ^a			
0	Ref.		Ref.
1	2.25 (2.07–2.44) ^{****}	2.29 (1.89–2.78) ^{****}	3.41 (2.19–5.32) ^{****}
≥ 2	5.22 (4.86–5.61) ^{****}	5.79 (4.78–7.01) ^{****}	7.19 (5.01–10.30) ^{****}
Bullied on school property in past year			
No	Ref.	Ref.	Ref.
Yes	1.11 (1.02–1.21) [*]	1.14 (0.96–1.34)	0.81 (0.51–1.25)
Electronic bullying in past year			
No	Ref.	Ref.	Ref.
Yes	1.06 (0.97–1.17)	1.15 (0.96–1.38)	1.41 (0.88–2.24)

^ap Value (Pr > |t|) < .05; ^{ns}p value (Pr > |t|) < .01; ^{****}p value (Pr > |t|) < .001; ^{****}p value (Pr > |t|) < .0001.

^aInvolvement in physical fight was used for weapons carrying behavior; involvement in physical fight at school was used for weapons carrying at school; involvement in physical fight was used for gun carrying behavior.

This association between carrying a gun and being white is particularly important in light of recurrent mass school shootings across the U.S. Although certainly not all school mass shootings have been committed by NHWs, the vast majority of shooters have in fact been white students (Katsiyannis et al., 2018). Accordingly, there is a need for future studies to further disentangle the relationship between race and weapon carrying among students in order to develop racially sensitive prevention programs aimed at curbing the rate of weapon-related violence at schools.

Furthermore, our finding is also important in the contexts of racialized discipline procedures and the high use of suspension against non-White minority students (Morris & Perry, 2016). Adults working with children have been found to harbor negative stereotypes against non-Hispanic Black and Hispanic youth, especially against older children, including labeling them as being more violent and/or aggressive compared with non-Hispanic whites and Asians (Priest et al., 2018). In fact, prior research has shown that NHB students are approximately three times as likely as NHW students to be suspended (Gregory et al., 2010). Interestingly, Peguero and Williams (2013) found that Black and Hispanic students who were from stereotypically disadvantaged backgrounds were more likely to experience bullying. Thus, it is possible that while minority students are perceived and portrayed as perpetrators of violence (Burgess et al., 2011), they are the ones not feeling safe at school and/or during their daily commute to and from school. Future interventions to prevent school violence should pay attention to this particular aspect of the problem by ensuring that all possible measures are in place to prevent bullying and other conditions that make students feel unsafe while educating the students, faculty, and staff to ensure that youth of color are not disproportionately punished and that non-Hispanic White youth are held accountable for their behaviors.

The higher likelihood of victims of bullying and other forms of aggression to carry weapons—observed in our study—are similar to those noted by Pham et al. (2017) from 2015 YRBS data. A study involving a large sample of grades 7–12 students in China found that being threatened or injured with a weapon in school was associated with both suicidal ideation and suicidal attempts after controlling for sociodemographic status, lifestyle-related factors, academic success, and self-reported physical and mental health (Wang et al., 2018). However, the aforementioned study did not look at the potential relationship, if any, between victimization by a weapon-carrying perpetrator and one's tendency to carry weapons.

Although the specific causal pathway could not be tested in the current study, it is possible that some students—who may not have carried weapons otherwise—are motivated to do so to cope with their feelings of lack of

safety, shaped by experiences of weapons-induced threats or injuries. It is also possible that carrying weapons including guns is perceived as a defense against potential risks of getting bullied, threatened, or injured and feeling unsafe in or on way to schools. Unfortunately, this coping behavior might be counterproductive and outright dangerous. A longitudinal study of serious juvenile offenders in two counties in the states of Arizona and Pennsylvania revealed that gun carrying reduced perceived risk while actually increasing chances of exposure to violence as well as higher perceived rewards of offending others (Loughran et al., 2016). In fact, a seminal case-control study that assessed the relationship between being shot in an assault and possession of a gun at the time, has shown that guns did not protect those who possessed them from being shot at an assault; in contrast, those who carry a gun were at higher odds of being shot at in an assault (Branas et al., 2009). Therefore, a disconnect between perceived and actual safety among those with weapons can be dangerous to themselves and others, and quickly result in an interaction turning violent. The findings of the current study suggest that weapons carrying by adolescents, which might be a fallout of their concern for personal safety owing to prior experiences of peer-perpetrated aggression, can be a high-risk behavior for themselves and others.

Limitations of our study include those of examining cross-sectional data, making it difficult to delve into temporality and causality. Furthermore, for questions asking about respondents' experiences within the past 30 days and/or past year, we have no way of knowing how recent the experience was relative to the time of the survey, a factor leading to recall errors and/or bias. Social acceptability bias—those possessing weapons being more prone to describe feeling unsafe and/or violence inflicted upon them—is also a possibility. Underreporting of behaviors deemed socially unacceptable or not permissible can be a problem with self-reports. Recounting the number of missing school days specifically due to a perceived lack of safety can be challenging. We also have no way of knowing the extent to which propensity to carry weapons—specifically firearms—were determined by easy access at their house or elsewhere. Lastly, while we adjusted for demographic variables such as race/ethnicity and gender, we were unable to examine potential interactions between these characteristics, which future studies might aim to understand.

Limitations notwithstanding, this study has used multiyear nationally representative data to explore a potential determinant—perceived lack of safety—of weapons carrying by high school students, a behavior with far-reaching public health concerns. While future research looking into the psychological motivations of possessing weapons is recommended, our findings offer a unique opportunity to address the crucial problems of school absenteeism induced by experiences of aggression and fears for safety as well as

preempt the consequences of weapons-possession by adolescents. Moreover, our results highlight the importance of developing racially sensitive prevention programs aimed at curbing the rate of weapon-related violence at schools. Such programs could include elements that provide students with conflict resolution skills and coping mechanisms to address bullying and feeling unsafe as an alternative to carrying a weapon.

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