Weapon Carrying Among Boys in US Schools by Race and/or Ethnicity: 1993–2019

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abstract

BACKGROUND: High adolescent gun-related mortality, gun violence, pro-gun policies, white supremacy, and the long-term socioeconomic and other effects of racial oppression are intricately linked in the United States. Racist prejudice depicts male individuals of color as more prone to criminality than white male individuals. We described long-term patterns of weapon carrying in US schools among non-Hispanic (NH) white, NH Black/African American, and Hispanic boys, hypothesizing that in contrast to racist stereotypes, boys of color did not bring weapons into schools more often than NH white boys in recent years.

METHODS: We conducted a time series analysis using 1993–2019 Youth Risk Behavior Surveillance System data comparing boys’ self-reported weapon carrying in a nationally representative sample of US high schools by race and/or ethnicity, age, and self-reported experience of safety and violence at school.

RESULTS: Weapon carrying in schools has declined among all boys. Comparing all schools, we found no significant differences in weapon carrying (4%–5%) by race and/or ethnicity in 2017 and 2019. Boys who reported experiencing violence or feeling unsafe at school were at least twice as likely to bring a weapon into school, and such negative experiences were more common among boys of color (8%–12%) than among NH white boys (4%–5%). In schools perceived as safer, NH white boys have been more likely to bring weapons into schools than NH Black/African American or Hispanic boys in the past 20 years.

CONCLUSIONS: Our findings contradict racist prejudice with regard to weapon carrying in schools, particularly in more favorable school environments. Making schools safer may reduce weapon carrying in schools where weapon carrying is most common.

WHAT’S KNOWN ON THIS SUBJECT: Racist stereotypes portray male individuals of color as more dangerous than white male individuals. Previous pooled analyses concluded that Black students more often carried guns than white students, but pooling could have hidden different long-term trends by race and/or ethnicity.

WHAT THIS STUDY ADDS: Our study contradicts racist stereotypes. We found no overall differences in weapon carrying by race and/or ethnicity. Weapon carrying was associated with perceived unsafety. In schools perceived as safer, non-Hispanic white boys carried weapons more often than boys of color.
Gun-related deaths are the second leading cause of mortality among children and adolescents in the United States\textsuperscript{1}; 2010 gun homicide rates among individuals aged 15 to 24 years were 49 times higher than in other high-income countries.\textsuperscript{2,3} In the past decade, there has been a growing epidemic of mass shootings in the United States, including in schools.\textsuperscript{4} In other countries, mass shootings have led to bans of assault weapons, for example in New Zealand after the Christchurch massacre or in Australia after the Port Arthur massacre.\textsuperscript{5} However, US federal legislation has not curbed access to guns, including access to military-style weapons that can kill a large number of people within seconds. The majority of perpetrators in US mass shootings have been white male individuals.\textsuperscript{6}

There are known connections between white supremacy groups and gun lobbying,\textsuperscript{7} and gun ownership rates are highest among white male individuals.\textsuperscript{8} In contrast, gun-related mortality is higher among Black, Indigenous, and People of Color (BIPOC) individuals than among white people,\textsuperscript{9} with stronger support for stricter gun control in Black than in white communities.\textsuperscript{10} Racial bias and distorted perceptions of criminality and violence are evidence of societal racism,\textsuperscript{10–13} including media coverage, which often frames incidents of violence with victims of color in ways that suggest moral shortcomings among victims while emphasizing the presumed innocence of white victims of violence.\textsuperscript{14} The consequence of such continued racialized misrepresentations of violence is that BIPOC individuals are treated with greater suspicion and severe repercussions, often with threats to their lives and incarceration.\textsuperscript{15} Conversely, white individuals receive relative leniency, with the clement treatment of overwhelmingly white armed insurgents at the US Capitol in January 2021 as a salient example, which was in sharp contrast to police brutality that BIPOC communities often experience.\textsuperscript{16} Historic and continuing racism affects all racial groups in our society and remains a root cause for greater poverty rates, fewer opportunities, and poorer health outcomes among many BIPOC communities.\textsuperscript{13,17–19}

The biennial cross-sectional Youth Risk Behavior Surveillance System (YRBS) survey has been conducted by the Centers for Disease Control and Prevention since 1991, collecting data on adolescents’ risk behaviors, including self-reported gun carrying and bringing weapons to school among high school students in the United States. In a recent study based on 1993–2017 YRBS data, researchers found a decline in self-reported gun carrying among adolescents since 1993. In this study, researchers found that in a pooled analysis, being Black was associated with increased odds of carrying a gun.\textsuperscript{20} In contrast, in a study based on 2005 YRBS data, the authors found that Black students were less likely to report bringing a weapon into school than white students.\textsuperscript{21} This apparent contradiction may be explained by differences in methodology or reflect differential impacts of policies on racial and/ or ethnic groups since the 1990s.

In the 1993–2017 study, researchers examined self-reported gun carrying, not weapon carrying, in schools; furthermore, pooling data over 25 years may hide differential trends by race and/or ethnicity over time. Findings from these two studies suggest more in-depth analyses examining self-report of weapon carrying at school are needed.

We used 1993–2019 YRBS data to describe time trends in weapon carrying at US high schools, comparing racial and/or ethnic groups. To better understand the association between school environments and weapon carrying behaviors, we differentiated between schools by students’ self-reported violence and safety experience at school. We hypothesized that weapon carrying at school, similarly to gun carrying, declined since 1993 and that weapon carrying would be linked to experiences of violence and unsafe school environments. Given stronger support for gun control in populations of color versus stronger gun lobbying in white populations, we hypothesized that in recent years, we would find no evidence that non-Hispanic (NH) Black/African American (AA) and Hispanic students were more likely to bring weapons into schools than NH white students. Because perpetrators of school shootings have been overwhelmingly male in the United States, we restricted our analyses to boys.

**METHODS**

**Data Source and Study Population**

We used data from the 1993–2019 YRBS surveys. Methods for recruitment and administration of the YRBS have been previously published.\textsuperscript{22} In brief, eligible YRBS participants include a representative sample of students among US public and private high schools. Students complete the surveys during the school day, administered by teachers and school administrators. All data are self-reported and remain confidential. Annual and the combined 1991–2019 data are publicly available, including question items on weapon carrying at schools added in 1993. We used the publicly available combined ...
1993–2019 national YRBS data set with responses from 205 068 students, of which 88 393 were male, NH Black/AA, Hispanic, or NH white, and with completed data on weapon-carrying at school.

**Measures**

We categorized race and/or ethnicity as NH white versus NH Black/AA versus Hispanic (the latter including the YRBS categories “Hispanic/Latino” and “multiple-Hispanic”). Small sample sizes prohibited quantitative analyses of other racial and/or ethnic groups.

Our main outcome was self-reported weapon carrying at school in the past 30 days (“During the past 30 days, on how many days did you carry a weapon, such as a gun, knife, or club, on school property?”). We used the dichotomous version: never (0 days) versus ever bringing a weapon into school (1 day, 2 or 3 days, 4 or 5 days, 6 or more days).

We stratified by age, perceived safety at school, and school violence. Age was dichotomized as ≤16 years versus ≥17 years. Participants’ safety and violence experience at school (termed “school climate” in this article) was derived from the following: (1) perceived school safety (“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?”), (2) having been threatened and/or injured (“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?”), and (3) getting into physical fights (“During the past 12 months, how many times were you in a physical fight on school property?”). We categorized each of these variables as never (0 times) versus ever (≥1 time) versus more often (≥2 times).

**Statistical Analyses**

We conducted a time trend analysis using weighted frequencies of carrying a weapon at school in the past 30 days (1993–2019) by survey year, race and/or ethnicity, and age group. We depicted joint probabilities of race and/or ethnicity in each age group with self-reported weapon carrying at school, aggregated over all schools and differentiating between schools according to students’ self-reported school climate (safety, injuries or threats, and physical fights). Rather than pooling the data, disaggregating by survey year, racial and/or ethnic group, and school climate captures variations in time trends that may be traced to policy and other structural changes over time. We visualized these time series using the R ggplot2 and tidyrverse packages, showing smoothed curves, weighted on the basis of the inverse variance of the point estimates.\(^{23,24}\) We visualized school climates by age and racial and/or ethnic group from 1993 to 2019 in the same manner. We used logistic regression by survey year to determine linear time trends in weapon carrying at school. All quantitative analyses accounted for the YRBS survey weights, which make the sample representative of US high schools, by using the SURVEYFREQ and SURVEYLOGISTIC procedures in SAS 9.4, Cary, NC (SAS Institute, Inc, Cary, NC).\(^{25}\)

**RESULTS**

Overall prevalence of weapon carrying in schools dropped substantially between 1993 and 2019. These trends were consistent across all racial and/or ethnic and age groups. Stratified analyses by students’ experience of safety and violence in schools also revealed consistent declines in weapon carrying (linear time trend, \(P < .0001\) for all groups) (Figs 1–4). In 2017 and 2019, 4.6% (95% confidence interval [CI]: 3.9%–5.4%) of all boys reported bringing a weapon into school (across all schools), without evidence for significant differences in weapon carrying by race and/or ethnicity (Table 1).

In 2017 and 2019, 93.3% (95% CI: 92.5%–94.1%) of all boys reported that they never missed school in the past 30 days because they felt unsafe, 92.3% (95% CI: 91.6%–92.9%) reported that they were never threatened or injured at school in the past 12 months, and 88.6% (95% CI: 87.6%–89.5%) reported that they were never in a physical fight at school in the past 12 months (Table 1).

Higher levels of negative school experience were associated with more frequent weapon carrying in all racial and/or ethnic and age groups. Prevalence of weapon carrying was at least 2 times higher among students who reported ever feeling unsafe or ever experiencing violence at school compared with those who did not (Table 1). Such negative experiences were more common among NH Black/AA and Hispanic boys compared with NH white boys. For example, 10.2% (95% CI: 7.5%–12.8%) of NH Black/AA and 9.7% (95% CI: 8.2%–11.1%) of Hispanic boys missed school at least once because of safety concerns compared with 4.5% (95% CI: 3.8%–5.3%) of NH white boys, and 10.2% (95% CI: 8.3%–12.0%) of NH Black/AA boys compared with 7.1% (95% CI: 6.3%–7.8%) of NH white boys were threatened or injured at school at least once in the past 12 months (Table 1). Experiences of perceived unsafety and threats and/or injuries at school have not substantially changed over time, especially for NH Black/AA and Hispanic boys (Supplemental Figs 5–7).
We found that at schools where students reported never missing school because of safety concerns, never being threatened or injured, or never being in physical fights (meaning in the vast majority of schools), NH white boys have been more likely to bring weapons into school compared with NH Black/AA and Hispanic boys since the late 1990s, especially among boys aged ≥17 years (Figs 2–4). In 2017 and 2019, there were no significant differences in weapon carrying at schools where students reported never missing school because of safety concerns (Table 1), but NH white boys were more likely than NH Black/AA or Hispanic boys to report bringing weapons into schools where they had never been threatened and/or injured (NH white 4.0% [95% CI: 3.0%–5.1%] versus NH Black/AA 2.9% [95% CI: 1.7%–4.1%] versus Hispanic 2.4% [95% CI: 1.7%–3.1%]), as well as in schools where they reported never having been in physical fights (NH white 3.8% [95% CI: 2.7%–4.8%] versus NH Black/AA 2.6% [95% CI: 1.5%–3.7%] versus Hispanic, 2.4% [95% CI: 1.7%–3.1%]) (Table 1).

At schools where students reported safety concerns or being in physical fights, differences in weapon carrying by race and/or ethnicity were not significant in 2017 and 2019 (Table 1). In schools where students reported having been threatened or injured, NH Black/AA and Hispanic boys more often reported bringing weapons into schools than NH white boys (2017 and 2019; NH Black/AA 28.7% [95% CI: 18.8%–38.5%] versus Hispanic 24.5% [95% CI: 17.6%–31.4%] versus NH white 13.2% [95% CI: 8.7%–17.7%]) (Table 1). In further examination of these results, we found that within the category of ever threatened, NH white boys more often reported being threatened and/or injured only 1 time compared with NH Black/AA and Hispanic boys, who more often reported being threatened and/or injured >10 times in the past 12 months, and more frequent threats and/or injuries were associated with greater odds of weapon carrying (Supplemental Tables 2 and 3).

**DISCUSSION**

As hypothesized, we found significant declines in weapon carrying in schools among high school-aged boys between 1993 and 2019 across all racial and/or ethnic and age groups and no differences in weapon carrying by race and/or ethnicity when comparing all schools in 2017 and 2019. Experiences of unsafety were linked to more frequent weapon carrying, and NH Black/AA and Hispanic boys more often reported such negative school experiences than NH white boys. We found that in schools perceived as safer, NH white boys have been more likely to carry weapons than NH Black/AA or Hispanic boys since the late 1990s, with the opposite pattern in schools where students experienced threats and/or injuries.

Racist prejudice continues to shape our perceptions of male individuals of color as more threatening and prone to criminality than white male individuals. Contrary to such stereotypes, when looking at weapon-carrying behaviors among high school-aged boys, our findings point to the opposite: aggregated over all schools, we could not find significant differences in weapon carrying by race and/or ethnicity in recent years; more compellingly, we found that in more favorable school climates, NH white boys have been more likely than NH Black/AA or Hispanic boys to bring weapons into school in the past 20 years.
years. NH white boys, especially aged ≥17 years, and not NH Black/AA or Hispanic boys, have posed the greater threat with regard to bringing weapons into schools that were perceived as safer.

Our findings are consistent with a previous study on 2005 YRBS data but do not allow us to draw causal conclusions. However, we can provide some context. Violence and crime rates peaked in the United States in the early 1990s. Since then, crime and violence have declined dramatically in all spheres of life in the United States. In 1994, the Gun-Free Schools Act (GFSA) was passed, with a federal mandate that students who bring weapons into schools be suspended for a year. However, neither the GFSA nor general declines in crime explain why NH white boys have been more likely than boys of color to bring weapons into safer school environments in the past 20 years.

In conjunction with the GFSA, zero-tolerance policies were implemented in US schools. These policies are characterized by severe punishment for small and serious infractions and are unevenly distributed across schools and student populations, with BIPOC students often experiencing harsher punishments than white students. Not only have these policies been criticized as racist and counterproductive, but our study also suggests that these policies may be ineffective in identifying a small group of white boys who have been bringing weapons into relatively safer schools at higher rates than students of color.

We found that in schools where students experienced unsafety and violence, weapon carrying was more common, and NH Black/AA and Hispanic boys were more likely to bring weapons into schools where they were threatened and/or injured. We contextualized the latter finding by revealing that the category of ever threatened and/or injured disguised, on average, more violent school experiences among NH Black/AA and Hispanic boys than among NH white boys. Together, these findings suggest that addressing school climates may be effective at reducing weapon carrying at schools.

Do our observations suggest that weapon carrying has been more restricted among boys of color than among NH white boys? This hypothesis seems plausible given persistent racism, the policing of persons of color, and evidence that white individuals are often allowed to openly carry guns, whereas individuals of color merely suspected of carrying any weapon have to fear for their lives. Furthermore, Black students are more often affected by school shootings; however, school shootings in primarily white schools...
tend to result in a greater number of casualties per incident, suggesting different intent or more dangerous weapons. School shootings that received wide media attention, such as Sandy Hook and Stoneman Douglas, were conducted by white perpetrators, but we were unable to find published summary data on perpetrator demographics or weapons used of all shootings in the United States.

Interventions to improve school climates are necessary at multiple levels, not just at schools, and must acknowledge that US schools are racialized institutions. Interventions include federal and state policies, such as permit-to-purchase and extreme-risk laws, raising the minimum age for gun purchases, secure firearm storage, and background checks; investment into low-income neighborhoods; prosecuting hate crimes; and holding police accountable for the unnecessary force against and over-policing of BIPOC communities. At a societal level, we must root out white supremacy in military and law enforcement institutions; stop pitting different racial and/or ethnic population groups against each other; close opportunity gaps through access to educational resources; expand mental health services, trauma-informed and positive youth development, conflict resolution programs, and antiracist curricula, which normalize and center the life experiences of BIPOC communities.

Often, we can draw from what already works: nationwide, community initiatives have successfully reduced local violence and addressed the impact of white supremacy.

Our knowledge on gun violence is limited even after decades of mass shootings in the United States. Until 2019, research on gun violence was impeded by the Dickey amendment, and state laws continue to prohibit research that could help prevent future violence. For example, the Minnesota statute blocks the state commissioner of health “from collecting data on individuals regarding lawful firearm ownership in the state or data related to an individual’s right to carry a weapon.” Given unabated suffering from gun violence in the United States, we are left to wonder for whose benefit such laws are in place.

Limitations

Our study has limitations. These cross-sectional data allow for examining time trends in weapon carrying but do not allow causal conclusions. Instead, we provided historical context and highlighted unanswered questions and gaps in the literature, which will have to be further examined in future studies. We examined perceptions of safety and violence in school, but other
potential confounders (for example socioeconomic status) were unavailable, as were measures of experiences of racism. There is a growing recognition of racism as a priority public health issue. The YRBS measures describing safety and violence at school (eg, never having missed school in the past 30 days because of safety concerns) do not adequately describe safe schools: many factors can contribute to students feeling unsafe before they miss a day of school. Furthermore, implications of safety and violence measures may vary by race and/or ethnicity: our supplemental analysis revealed that having ever been threatened disguised, on average, worse school experiences for students of color. Future research should probe the types of threats experienced by different racial and/or ethnic groups, which may have important implications for school programs and policies.

CONCLUSIONS
This systematic assessment of weapon carrying in US high schools over the past 26 years highlights important areas for future research. The patterns of weapon carrying we found confirmed that unsafe school environments are linked to increased weapon carrying and contradict prevailing racist stereotypes: in schools perceived as safer, NH white boys have been most likely to carry weapons in the past 20 years. We found it disturbing how few reliable data we were able to find to contextualize our findings (eg, aggregated demographic data on gun perpetrators and gun sales). The lack of accessibility to such basic information in the United States where guns are used to kill almost 40,000 individuals each year demonstrates the vast knowledge gaps left behind by 25 years of suppressed public health research on gun violence. Neither general declines in crime rates nor the GFSA or zero-tolerance approaches have prevented an epidemic of mass shootings and everyday gun violence, in schools and elsewhere. We believe this work offers an important foundation for much needed research to disentangle the intertwined phenomena of racism, toxic environments of violence, and gun- and weapon-culture in the United States.

ABBREVIATIONS
AA: African American
BIPOC: Black, Indigenous, and People of Color
CI: confidence interval
GFSA: Gun-Free Schools Act
NH: non-Hispanic
YRBS: Youth Risk Behavior Surveillance System
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<tr>
<th>TABLE 1 Characteristics of the Study Population of Boys, by Race and/or Ethnicity, YRBS 2017–2019</th>
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<td>All, Weighted % (95% CI)</td>
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<td>Age, y</td>
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<td>Missed school in the past 30 d because felt unsafe</td>
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<td>0 times</td>
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<tr>
<td>Was threatened and/or injured at school in past 12 mo</td>
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<td>In physical fight in the past 12 mo</td>
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<td>0 times</td>
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<tr>
<td>Weapon carrying at school in the past 30 d</td>
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<td>Any school</td>
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<td>In schools where student reported missing school in the past 30 d because they felt unsafe</td>
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<td>In schools where student reported being threatened and/or injured in the past 12 mo</td>
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<td>In schools where student reported being in a physical fight in the past 12 mo</td>
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<td>2+ times</td>
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* Values indicate P values < .05.
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