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## Experiences of Online Bullying and Offline Violence-Related Behaviors Among a Nationally Representative Sample of US Adolescents, 2011 to 2019

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### Human Subjects Approval Statement

YRBS is approved through the Centers for Disease Control and Prevention's IRB office. De-identified national data are publicly available for analysis, exempt from institutional review. This analysis does not constitute human subjects research. Preparation of this paper did not involve data collection or research involving human subjects, and therefore, no institutional review board approval was required.

### Conflict of Interest

The authors declare no conflict of interest.

### SUPPORTING INFORMATION

The following Supporting Information is available for this article:

Additional supporting information may be found online in the Supporting Information section at the end of the article.

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## Abstract

**BACKGROUND:** Being bullied online is associated with being bullied in school. However, links between online bullying and violence-related experiences are minimally understood. We evaluated potential disparities in these associations to illuminate opportunities to reduce school-based violence.

**METHODS:** We used five cohorts of Youth Risk Behavior Survey national cross-sectional data (2011-2019,  $N_{\text{total}} = 73\,074$ ). We used survey-weighted logistic and multinomial models to examine links between online bullying and five school-based violence-related experiences: offline bullying, weapon carrying, avoiding school due to feeling unsafe, being threatened/injured with a weapon, and physical fighting. We examined interactions by sex, race/ethnicity, and sexual identity.

**RESULTS:** Being bullied online was positively associated with all offline violence-related behaviors. Groups with stronger associations between online bullying and physical fighting, including boys, adolescents whose sexual identity was gay/lesbian or unsure, and many adolescents of color (Black, Hispanic/Latino, and Asian/Pacific Islander adolescents), had stronger associations between online bullying and either weapon carrying or avoiding school.

**CONCLUSIONS:** Online bullying is not an isolated harmful experience; many marginalized adolescents who experience online bullying are more likely to be targeted in school, feel unsafe, get in fights, and carry weapons. Reduction of online bullying should be prioritized as part of a comprehensive school-based violence prevention strategy.

## Keywords

violence; adolescent; bullying

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Online bullying persists as a significant public health problem among adolescents with the proliferation of different types of social media and increased digital communication. Based on a 2020 synthesis of longitudinal estimates from 2007 to 2017, being bullied online had a median prevalence of 14.4% for adolescents and children.<sup>1</sup> US data from 2019 suggest that 15.7% of high school students were bullied online.<sup>2</sup> Being bullied online has distinct, harmful psychological impacts; youth who are targets of online bullying are more likely to report being anxious and depressed, and engage in intentional self-harm.<sup>3-6</sup> Online bullying is also associated with decreased academic engagement,<sup>7</sup> and is an established predictor of in-person bullying during the school days, which can take the form of relational aggression (such as spreading rumors or excluding people) and physical bullying.<sup>8</sup> This in-person (or “offline”) bullying is also damaging, increasing risk of adolescent psychiatric disorders and suicide attempts.<sup>9,10</sup> Bullying, both online and offline, constitutes an important threat to the safety and well-being of adolescents. Online bullying specifically is not only a highly

prevalent threat to adolescent well-being, but is recognized as increasingly pertinent to the social lives of adolescents given the shift to online engagement and socialization following the spread of COVID-19.<sup>11</sup>

Even though online bullying is often perpetrated by classmates who may engage in further violence at school,<sup>12-14</sup> there is limited research examining the extent to which online bullying is linked to engagement in other offline violence-related behaviors in and out of school, either as a target or a perpetrator. For example, adolescents who fear for their safety following experiences with online bullying may subsequently carry weapons to school for protection.<sup>15,16</sup> Conversely, weapon carrying behavior declines as online threats decline.<sup>14</sup> Further, adolescents who are bullied online are often then targeted offline for physical violence, and targets of online bullying are more likely to engage in subsequent violent behaviors due to shifting perceptions of safety.<sup>12</sup>

Even less is understood about the relationship between online bullying and other offline violence-related behaviors, such as avoiding school due to feeling unsafe and being threatened or injured with a weapon.<sup>17</sup> Little research links experiences of online bullying to the frequency of violence-related behaviors in and out of school.<sup>4</sup> It is not known whether the associations between online bullying and injury and violence-related behaviors are stronger for higher levels of fighting, weapon carrying, threats and school avoidance (for instance, predicting multiple fights at school more strongly than a single school fight). The potential importance of online bullying as a predictor of a broader spectrum of offline violence and injury outcomes in and out of school is a public health priority underscored by the estimated 164 000 US adolescents ages 15 to 19 who experienced injuries related to violence from others in 2018.<sup>18</sup>

At the same times, it is critically important to note that groups who are marginalized due to sex and gender, race/ethnicity, and sexual orientation discrimination and prejudice face greater rates of bullying, both on and offline.<sup>19,20</sup> Subsequently, these groups may experience a stronger connection between online bullying and engagement in violent behaviors in and out of school due to a perceived lack of safety. Bullying and other experiences with violence are shaped by these identities,<sup>21-25</sup> as mechanisms by which marginalized youth are harmed.<sup>26,27</sup> By understanding the disparities and interactions of marginalized groups, we can better address the diverse needs of adolescents facing experiences of violence and injury both in and out of school. Perhaps most importantly, we can subsequently identify and implement more effective means of intervention and support.

In this nationally representative study of US adolescents in grades 9 to 12 between 2011 and 2019, we evaluated the associations between being bullied online and multiple violence-related behaviors: weapon carrying (overall, at school, and with a firearm), school avoidance due to perceived lack of safety, being threatened or injured with a weapon, and physical fighting (overall and at school). In order to identify marginalized groups whose experience potentially modifies these associations, we also examined the potential moderating role of sex, race/ethnicity, and sexual identity.

## METHODS

### Participants

We used five cohorts of the Centers for Disease Control and Prevention's (CDC's) Youth Risk Behavior Surveillance (YRBS) national cross-sectional data from 2011 to 2019. These survey data were collected biennially, yielding a total sample size of 73 074 across these years.

### Instrumentation/Measures

The YRBS questionnaire features two items on bullying (dichotomous yes/no). It examined offline bullying with the question, "During the past 12 months, have you ever been bullied on school property?" The survey assessed online bullying with the question, "During the past 12 months, have you ever been electronically bullied? (Count being bullied through texting, Instagram, Facebook, or other social media.)". While bullying can take a variety of forms both online and offline, including physical violence, verbal insults, harmful messages, and other forms of repeated interpersonal harm, the definition of what constitutes bullying was left to the individual respondent in the YRBS. For our analyses, being bullied online was the main predictor, while being bullied offline was one of several distinct outcomes.

Aside from offline bullying, other study outcomes related to seven types of offline experiences of injury and violence. Three of these experiences were related to weapon carrying/preparation for violence: (1) weapon carrying, "During the past 30 days, on how many days did you carry a weapon such as a gun, knife, or club?"; (2) weapon carrying at school, "During the past 30 days, on how many days did you carry a weapon such as a gun, knife, or club on school property?"; (3) carrying a gun, "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.)". The item that asked about carrying a gun was only available from 2017 onward. One item was related to perceived safety: (4) avoiding school due to feeling unsafe, "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?". Three items were related to being targeted for violence: (5) being threatened or injured with a weapon, "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?"; (6) being in a physical fight, "During the past 12 months, how many times were you in a physical fight?"; and (7) being in a physical fight at school, "During the past 12 months, how many times were you in a physical fight on school property?"

Sex was self-reported as "female" or "male," and race/ethnicity was based on five categories with the option to choose as many as applicable, then categorized into six mutually-exclusive categories: American Indian/Alaskan Native, Asian and Pacific Islander, non-Hispanic Black or African American, Hispanic/Latino, non-Hispanic white, and non-Hispanic Multiracial.

Sexual identity was assessed from 2015 to 2019 in the national dataset, with response options of "heterosexual (straight)," "bisexual," "gay/lesbian," or "not sure."

## Procedure

The YRBS employs a multistage cluster sample design that featured primary sampling units of counties categorized into strata based on urbanicity and racial/ethnic composition, secondary units that pinpointed specific schools, and tertiary units of specific classes.<sup>28</sup> Sample weighting accounted for grade, race/ethnicity and sex to adjust for nonresponse and oversampling of certain groups. These weights were scaled to match national population proportions, making the sample representative of all US students in public or private school, grades 9 to 12.<sup>28</sup> Participation is voluntary and anonymous. The student response rate ranged from 80.3% (2019) to 88% (2013), while the school response rate ranged from 69% (2015) to 81% (2011). The YRBS study protocol was approved by the CDC's Institutional Review Board.<sup>28</sup> Details on the full YRBS methodology are detailed elsewhere.<sup>28</sup>

## Data Analysis

All statistical analyses accounted for the complex sampling design of the YRBS. We used the SURVEYFREQ and SURVEYLOGISTIC procedures (SAS 9.4) to incorporate sample weights and the complex sample design, estimate prevalence, and fit logistic and multinomial logistic regression models. We used the DOMAIN statement for subpopulation inference.

First, we examined the weighted prevalence of being bullied online and offline, and the other injury and violence-related behaviors, overall and by sex, race/ethnicity, and sexual identity (from 2015 to 2019). Then, we examined the association between our predictor, being a target for online bullying, and the eight outcomes (offline bullying and the seven injury/violence-related behaviors) overall, with each outcome dichotomized into “any” vs “none” using logistic regression, as well as with original response categories using multinomial logistic regression. For the multinomial models, full response categories for the offline bullying and other offline injury/violence behavior outcomes are in Supplemental Table S1. We also examined these overall associations adjusting for sex, race/ethnicity, year (2011, 2013, 2015, 2017, 2019), and grade (9th, 10th, 11th, 12th). We further examined multiplicative interactions between online bullying and demographic factors of sex, race/ethnicity, and sexual identity with each outcome and estimated the associations between online bullying and other outcomes stratified by sex, race/ethnicity, and sexual identity. It should be noted that these analyses only reflect the experiences of those who report being targeted by online bullying, lacking data on the actions of perpetrators.

## RESULTS

### Prevalence of Bullying, Weapon Carrying, Perceived Safety, and Violence

Bullying and violence-related outcomes ranged in prevalence from carrying a weapon at school in the past 30 days (4.3%) to being in a physical fight within the past year (25.3%), and online bullying was associated with elevated prevalence of all outcomes. Full information on outcome prevalence, overall and by online bullying status, is available in Table 1.

## Associations Between Online Bullying and Offline Injury and Violent Outcomes

Nearly two thirds (63.3%) of adolescents who reported online bullying also reported offline bullying (Figure 1). Prevalence of each violence-related outcome was also elevated; these outcomes were often more than twice as prevalent among youth experiencing bullying online.

Table 2 quantifies the associations between being bullied online and being bullied offline, weapon carrying, nonattendance due to lack of perceived safety, and being targeted for violence. Adolescents who were bullied online had 12.95 times the odds of being bullied offline compared to their peers (Table 2, 95% confidence interval [CI]: 12.03, 13.95). The associations between online bullying and the other injury and violence-related behaviors ranged from carrying a weapon overall (odds ratio [OR] = 1.35, 95% CI: 1.25, 1.46) to the violence outcome of being injured or threatened with a weapon at school (OR = 4.38, 95% CI: 3.99, 4.80). These associations remained strong, and some were stronger, after adjusting for sex, race/ethnicity, year and grade.

Supplemental Table S1 examines the association between online bullying and the number of occurrences of weapon carrying, perceived lack of safety, and being targeted for violence. For some outcomes, particularly those related to weapon carrying, the association between online bullying and each outcome level of frequency was relatively consistent. In contrast, for perceived safety and violence outcomes, the relationship was stronger for higher levels of the outcome, even after adjustment for sex, race/ethnicity, year, and grade (Supplemental Table S1, aOR [1 times being in a physical fight at school, past year vs 0]: 2.46, 95% CI: 2.18, 2.78; aOR [12+ times vs 0]: 10.39, 95%: 7.42, 14.55). Unadjusted results followed similar patterns (Supplemental Table S2).

Table 3 shows the association between each demographic factor (sex, race/ethnicity, and sexual identity) and each outcome, using “female,” “API,” and “heterosexual” as the respective reference groups given that most outcomes were least prevalent in these groups. Overall, disparities in bullying are evident and concentrated among some of the least advantaged groups. Bullying prevalence was elevated for female students, non-Hispanic Multiracial students, and sexual minority students. The violence/injury outcomes had varied associations with demographics. Generally, these outcomes were more prevalent among male students (with the exception of nonattendance due to perceived safety), American Indian and Alaskan Native students (who also had high levels of being bullied) and sexual minority students (especially for items relating to being threatened and feeling unsafe).

## Effect Modification by Social Identity Subgroups

Table 4 summarizes the associations between online bullying and each of the other outcomes stratified by sex, race/ethnicity, and sexual identity. Interaction between sex and online bullying was significant when predicting two outcomes, the perceived safety outcome of avoiding school due to feeling unsafe (interaction p-value: .01) and physical fighting at school (interaction p-value: .02). The prevalence of each outcome by sex and online bullying status is depicted in Supplemental Figure S1, showing that the perceived safety outcome of avoiding school and the violence outcome of physical fighting at school were more



closely linked to being bullied online for male students. For the association between being bullied online and school avoidance, boys had an OR of 4.31 (Table 4, 95% CI: 3.71, 5.01) compared to the OR for girls, 3.31 (95% CI: 2.88, 3.81). For the link between being bullied online and physically fighting at school, boys had an OR of 2.98 (95% CI: 2.66, 3.34) compared to the OR for girls, 2.43 (95% CI: 2.13, 2.78).

Interaction between race/ethnicity and online bullying was significant when predicting weapon carrying overall (interaction p-value <.0001) or at school (interaction p-value: .0002), and physical fighting in general (interaction p-value: .0036) or at school (interaction p-value: .02) The prevalence of each of these outcomes by race/ethnicity and online bullying status is depicted in Supplemental Figure S2, which demonstrates that the link between being bullied online and carrying a weapon in general or at school specifically was weaker among American Indian/Alaskan Native and white students (Table 4, OR between being bullied online and carrying a weapon at school, AI/AN: 1.37, 95% CI: 0.58, 3.25; white: 1.48, 95% CI: 1.24, 1.77) compared to other racial and ethnic groups (largest OR, Hispanic/Latino: 3.02, 95% CI: 2.36, 3.88). For items related to violence, such as being in a physical fight overall and at school specifically, the link between being bullied online and these outcomes was weaker for white and non-Hispanic Multiracial students (OR between being bullied online and fighting at school, Multiracial: 1.50, 95% CI: 1.04, 2.17; white: 2.25, 95% CI: 1.99, 2.54) compared to other racial and ethnic groups (largest OR, Asian and Pacific Islander: 3.26, 95% CI: 2.14, 4.95).

Interaction between sexual identity and online bullying was significant when predicting offline bullying (interaction p-value: .0036), carrying a gun (p: .02), carrying a weapon overall (p < .0001), being in a physical fight overall (p < .0001), and being in a physical fight at school (p: .01). The prevalence of each of these outcomes is depicted in Supplemental Figure S3, which shows that for many weapon carrying and violence outcomes, the links between online bullying and these outcomes were strongest among adolescents reporting their sexual identity as “not sure” (Table 4, OR between online bullying and physical fighting, “not sure”: 4.72, 95% CI: 3.31, 6.73; heterosexual: 1.80, 95% CI: 1.62, 2.01). This “not sure” group was typically followed by bisexual or gay/lesbian adolescents in terms of strength of association between online bullying and other injury/violence outcomes.

Among those who were not bullied online, the prevalence of these outcomes by sexual identity group shows very little difference; among those who were bullied online, however, the differences were pronounced. For instance, the prevalence of physical fighting at school for adolescents who were not bullied online ranged from 6.7% to 7.4% across sexual identity categories, showing very little variation. Among adolescents who were bullied online, however, the prevalence differences were severe, ranging from 13.6% among heterosexual adolescents to 27.1% in the “not sure” group, double the prevalence among heterosexual peers.

All interactions between online bullying and demographics predicting each outcome are summarized in Supplemental Table S3.

## DISCUSSION

The present study detailed the prevalence of, and links between, online bullying, offline bullying, and seven types of offline injury/violence in and out of school among a nationally representative sample of US adolescent youth between 2011 and 2019. Our results highlight significant associations between being bullied online and school-based violence-related outcomes (e.g., 17.4% of those bullied online have been threatened or injured with a weapon in the past year vs 4.6% of those not bullied online). Our findings also underscore critical disparities in these associations by sex, race/ethnicity, and sexual identity, with generally stronger associations between online bullying and various violence outcomes for boys, Black, Hispanic/Latino, and Asian/Pacific Islander students, and sexual minority students.

Study results indicate that online bullying is tied to experiences of physical violence, as well as weapon carrying. These results were robust to various model specifications and levels of adjustment. This may be the product of fear or self-defense<sup>29</sup> or indicative of more general reciprocity between being bullied online and other violence-related behavior. Just as online bullying is linked to weapon carrying,<sup>14,29</sup> carrying a weapon is also tied to later experiences of being bullied online.<sup>14</sup> These and other results suggest a reinforcing loop of being targeted.<sup>12,30</sup> Online bullying reduction may reduce the presence of weapons among adolescents, both directly and through the pathway of reducing perceived risks of physical danger. Studies testing causal and temporal pathways for these factors are needed.

While there were few sex differences in the link between online bullying and offline injury and violence-related behaviors, differences that emerged aligned with prior research.<sup>31,32</sup> Experiences of online bullying are more closely linked to behavioral problems, such as aggression and fighting, for boys, as opposed to girls for whom being bullied online is more closely linked to internalizing symptoms and emotional dysregulation.<sup>31</sup> This supports the stronger observed link between online bullying and physical fighting at school for boys, and this elevated threat of physical harm may explain the stronger association between school nonattendance due to reduced perceived safety and online bullying for boys. While the reasons for school avoidance cannot be assessed with these data, this information would help shed light on the extent to which online bullying drives school avoidance. School avoidance, and the broader range of outcomes described in this study, are important educational issues apart from just health determinants.<sup>33</sup> If the threat of violence hinders academic participation, focus, or safety, academic performance will suffer. School-based professionals should work to reduce this violence not only to improve the health and safety of adolescents, but to ensure educational success.

Effect modification in the links between online bullying and offline injury and violence-related behaviors was particularly salient along race/ethnicity. For example, bullying was more weakly associated with violence or weapon-related outcomes among white students than among most students of color. While less research has examined the role of race and ethnicity in experiences of online bullying,<sup>34</sup> bias-based bullying persists as a deeply harmful set of physical, verbal, and relational behaviors that actively targets and harms students of color, increasing risk for mental health problems.<sup>22</sup> Online bullying shapes disparities surrounding these injury and violence-related outcomes to the point where,



for instance, weapon carrying at school was higher for white students who were not bullied online than it was Black, Hispanic/Latino, Asian and Pacific Islander peers, but the opposite was true for those who were bullied online. The stronger link between online harm and offline violence and weapon carrying for adolescents of color is concerning, and interventions to reduce this behavior should recognize that online bullying is a single component of a larger pattern of harm toward adolescents of color.

The role of online bullying also appears particularly impactful for the offline injury and violence outcomes of sexual minority adolescents. Online bullying was much more common among sexual minority youth in this sample between 2015 and 2019, which aligns with other studies that report a prevalence of being bullied online among sexual minority youth as high as 71.3%.<sup>35</sup> Among those who are not bullied online, sexual minority youth exhibit similar levels of weapon carrying and physical fighting compared to heterosexual peers, and as such, disparities in violence by sexual identity group primarily emerge only among those bullied online. It may be that online bullying is especially harmful for these adolescents at a vulnerable developmental period of identity formation. Common forms of online bullying toward these youth include slurs or threats of forced disclosure of concealed sexual identity or “outing,”<sup>36</sup> and reporting this online harm is often difficult because it typically requires exposing one’s stigmatized identity, adding an obstacle to getting help.<sup>35</sup>

Particular attention should be given to online bullying prevention efforts for sexual minority youth, especially those in the “not sure” identity who had the strongest links between online bullying and offline injury and violence-related behaviors. Experiencing harassment on top of development of their sexual identity likely adds significant psychological distress along minority stress pathways, distress that may contribute to offline injury and violence-related behaviors.<sup>37</sup> Schools and other supportive environments should aim to reduce this distress by creating an inclusive environment that holds those who bully and enact violence accountable.

Future research should examine additional context surrounding fights, such as instigation, repeated fights with the same individual, and the extent to which weapons factored into violence. These pathways linking experiences of online bullying and other outcomes are clearly even more critical to understand for higher levels of offline violence, given our findings that online bullying was more strongly associated with the highest frequencies of physical fighting, being threatened or injured with a weapon, or avoiding school due to feeling unsafe. Experiences of online bullying, then, identified adolescents at risk for more frequent harm.

### Limitations

This study has limitations that should be considered when interpreting the results. These cross-sectional data do not have information on the temporal ordering between online bullying and offline injury/violence outcomes, thus the contribution of the present study is in identifying the strong links between the two, situating experiences of online bullying within broader patterns of being targeted for violence. Further research with a longitudinal design can help to disentangle the causal direction of these important connections. Several of the survey items (such as physical bullying) were specific to instances occurring on

school property, and so instances of bullying outside of these spaces went unreported. Also, data only address the experiences of targets of online bullying, rather than the actions of perpetrators.

Additionally, items on injury and violence-related behaviors lacked context on the reasons behind certain actions (such as carrying a weapon in the pursuit of self-defense or for other reasons), thus making it difficult to extrapolate the motivation for engaging in these behaviors. These items also had different reference periods, with some reflecting the past month and some reflecting the past year. Demographic items were similarly limited, with no capacity to examine gender apart from sex, few sexual identity options (for instance, missing queer and asexual) starting only in 2015, and a limited race/ethnicity item.

While the YRBS aims to be nationally representative, certain years are missing data from individual states, limiting the representativeness of the findings. For instance, in 2019, Wyoming, Minnesota, Oregon, and Washington did not participate.<sup>28</sup> Furthermore, these results may not necessarily apply to other countries. However, existing international evidence suggests consistent links between adolescents being bullied online and offline experiences of bullying and violence.<sup>38-41</sup> Thus, the associations presented in this study should be investigated elsewhere to confirm the extent to which these connections potentially generalize to other regions.

Lastly, as these data were collected during the school days, these data also do not represent various subsets of adolescents, such as homeschooled students, homeless youth not attending school, or youth involved with the juvenile justice system who may not be in school.

## Conclusions

Being bullied online is significantly associated with offline injury and violent behaviors in and out of school. Moreover, these associations are patterned by demographic factors, with online bullying predicting many of these behaviors for boys, sexual minority adolescents, and adolescents of color more strongly. Efforts to significantly reduce online bullying are an urgent public health priority with the potential to limit troubling in-person behaviors such as physical violence and weapon carrying. These goals are especially important for marginalized adolescents who may be particularly impacted by online bullying and its consequences.

## IMPLICATIONS FOR SCHOOL HEALTH

Our findings underscore that school-based violence prevention programs must acknowledge the risk posed by online bullying. There are several specific practices that schools may consider implementing as they seek to address online bullying and its impact among their students. Counselors and teachers should draw on trauma-informed practices (ensuring safety and building/maintaining trust) to query students about their experiences of online bullying, either as a semi-regular check-in or when something seems to be troubling a student.<sup>42</sup> Schools should similarly consider implementing programs that establish anti-bullying digital norms. These programs should teach digital etiquette and respect, and

explicitly state the harmful impact of online bullying on targets while leveraging school counselors and psychologists as crucial resources for adolescent health.<sup>43</sup>

Given the low rate of disclosure by students, schools should also consider opening pathways for young people to communicate when they are being targeted by establishing protocols in which students can anonymously report incidents of online bullying and know that this bullying will be addressed by the school. Setting up an anonymous reporting site online for students would empower students to hold online bullying accountable while leveraging the safety of online anonymity. This type of reporting could occur in conjunction with existing school behavioral threat assessment efforts that have also been shown to be an effective component of a comprehensive school violence prevention strategy.<sup>44-46</sup>

Even further, responses to reports of online bullying should recognize the potential for co-occurring offline bullying and other injury and violence-related behaviors. Online bullying is not an isolated domain of harm toward adolescents, and so anti-violence interventions must be comprehensive, addressing a broad array of offline experiences. Additionally, schools will need to collaborate with other people to maximize program effectiveness, as efforts to address bullying generally are more effective with sustained, long-term programs that engage parents and communities, rather than single assemblies that place sole responsibility on adolescents.<sup>47</sup> Indeed, recent research has specifically underscored the importance of strong parent-teacher connections in reducing future incidents of online bullying among students.<sup>48</sup>

Some experiences of school-based violence are clearly shaped by sex, race/ethnicity, and sexual identity-based marginalization, and so teachers should be trained to address the unique issues that impact marginalized students (examples including students of color facing racist bullying, sexual minority adolescents facing homophobia) in addition to more general anti-bullying and anti-violence training. All adolescents are at risk for being the target of online and offline bullying and violence, and so educators and other school-based professionals must continue to be equipped to understand and reduce these behaviors.

## Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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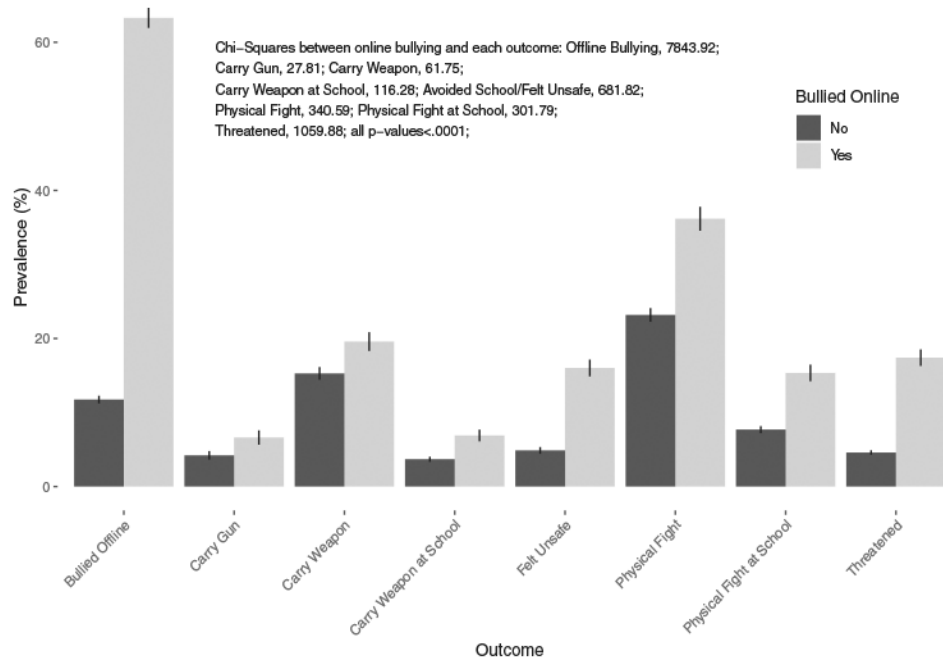
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**Figure 1.** Prevalence and 95% Error Bars of Offline Injury/Violence-Related Behaviors by Online Bullying Status, 2011 to 2019 YRBS

**Table 1.**

Distribution of Outcomes and Demographic Characteristics, 2011 to 2019

Variable	Overall (%)	Adolescents Bullied Online (%)	Adolescents Not Bullied Online (%)
Bullied online	15.4	-	-
Bullied offline	19.7	63.3	11.7
Carried a weapon	16.0	19.6	15.3
Carried a weapon at school	4.3	6.9	3.7
Carried a gun	4.6	6.6	4.2
Avoided school/felt unsafe	6.8	16.0	4.9
Threatened/injured with weapon	6.7	17.4	4.6
Physical fight	25.3	36.2	23.2
Physical fight at school	9.0	15.3	7.7
Sex			
Male	50.6	32.7	53.8
Female	49.4	67.3	46.2
Race/ethnicity			
American Indian/Alaskan Native	0.7	0.7	0.6
Asian and Pacific Islander	4.4	3.7	4.5
Black	13.6	7.9	14.4
Hispanic/Latino	22.4	18.4	23.0
White	54.4	63.6	53.0
Multiracial	4.6	5.6	4.4
Sexual identity*			
Heterosexual	86.3	77.5	88.0
Gay/lesbian	2.3	3.3	2.1
Bisexual	7.5	13.9	6.3
Not sure	3.9	5.3	3.6

Note: All models accounted for complex survey design.

\* 2015 to 2019 only, n = 44 066.

**Table 2.**

Odds Ratios of Online Bullying Predicting Offline Injury/Violence-Related Behavior Outcomes, 2011 to 2019 YRBS

	<b>Unadjusted OR (95% CI)</b>	<b>Adjusted* OR (95% CI)</b>
Bullied offline	12.95 (12.03, 13.95)	12.51 (11.57, 13.53)
Carried a weapon	1.35 (1.25, 1.46)	1.87 (1.73, 2.01)
Carried a weapon at school	1.93 (1.71, 2.19)	2.54 (2.22, 2.90)
Carried a gun	1.61 (1.35, 1.93)	2.22 (1.83, 2.70)
Avoided school/felt unsafe	3.71 (3.38, 4.08)	3.98 (3.58, 4.43)
Threatened/injured with weapon	4.38 (3.99, 4.80)	5.46 (4.95, 6.02)
Physical fight	1.88 (1.76, 2.01)	2.42 (2.26, 2.60)
Physical fight at school	2.18 (1.99, 2.38)	2.95 (2.68, 3.24)

\* Adjusted for sex, race/ethnicity, grade, and year; all models accounted for complex survey design.

Abbreviations: OR, odds ratio; 95% CI, 95% confidence interval.

Table 3.

Prevalence and Odds Ratios of Bullying and Injury/Violence-Related Behaviors, Overall and by Sex, Race/Ethnicity, and Sexual Identity, 2011 to 2019  
 YRBS, N<sub>Total</sub> = 73 074

	Bullied Online		Bullied Offline		Carried a Weapon		Carried a Weapon at School		Carried a Gun		Avoided School/ Felt Unsafe		Threatened/ Injured With Weapon		Physical Fight		Physical Fight at School	
	%	OR (95% CI)	%	OR (95% CI)	%	OR (95% CI)	%	OR (95% CI)	%	OR (95% CI)	%	OR (95% CI)	%	OR (95% CI)	%	OR (95% CI)	%	OR (95% CI)
Overall *	15.44	-	19.70	-	15.99	-	4.26	-	4.66	-	6.75	-	6.72	-	25.32	-	8.95	-
Sex																		
Male	9.96	0.42 (0.39, 0.45)	16.14	0.63 (0.60, 0.67)	24.56	4.15 (3.83, 4.51)	6.23	3.00 (2.64, 3.40)	7.26	3.92 (3.17, 4.85)	5.94	0.78 (0.72, 0.85)	8.03	1.58 (1.44, 1.72)	31.79	2.09 (2.02, 2.17)	12.06	2.27 (2.09, 2.46)
Female	21.00	Ref	23.29	Ref	7.27	Ref	2.17	Ref	1.96	Ref	7.45	Ref	5.26	Ref	18.67	Ref	5.70	Ref
Race/ethnicity																		
AIAN	17.57	1.41 (1.06, 1.87)	23.60	1.66 (1.30, 2.12)	23.64	3.17 (2.44, 4.11)	8.45	2.62 (1.70, 4.05)	8.43	4.71 (2.20, 10.11)	13.93	2.46 (1.66, 3.66)	11.80	2.23 (1.49, 3.35)	36.33	2.83 (2.18, 3.68)	12.70	1.96 (1.36, 2.83)
API	13.15	Ref	15.70	Ref	8.91	Ref	3.40	Ref	1.92	Ref	6.17	Ref	5.65	Ref	16.76	Ref	6.90	Ref
Black	9.15	0.67 (0.56, 0.79)	13.10	0.81 (0.68, 0.97)	12.11	1.41 (1.18, 1.68)	3.95	1.17 (0.87, 1.57)	6.77	3.72 (2.35, 5.87)	8.20	1.36 (1.08, 1.70)	8.37	1.53 (1.20, 1.94)	34.33	2.60 (2.22, 3.04)	14.48	2.29 (1.83, 2.86)
Hispanic/ Latino	12.72	0.96 (0.82, 1.13)	16.52	1.06 (0.91, 1.25)	13.92	1.65 (1.38, 1.99)	4.29	1.27 (0.94, 1.74)	5.75	3.12 (2.00, 4.88)	9.33	1.56 (1.25, 1.95)	7.39	1.33 (1.07, 1.67)	27.10	1.85 (1.59, 2.14)	9.92	1.48 (1.21, 1.82)
White	17.97	1.45 (1.25, 1.67)	22.55	1.56 (1.35, 1.82)	17.91	2.23 (1.86, 2.68)	4.14	1.23 (0.90, 1.68)	3.74	1.99 (1.29, 3.07)	5.07	0.81 (0.64, 1.03)	5.76	1.02 (0.81, 1.29)	22.47	1.44 (1.24, 1.67)	7.01	1.02 (0.82, 1.27)
Multiracial	18.94	1.54 (1.31, 1.82)	24.01	1.70 (1.42, 2.03)	19.29	2.45 (1.98, 3.02)	5.32	1.60 (1.10, 2.31)	4.59	2.46 (1.42, 4.28)	7.70	1.27 (0.95, 1.69)	8.89	1.63 (1.24, 2.15)	30.79	2.21 (1.87, 2.61)	11.03	1.67 (1.32, 2.13)
Sexual identity <sup>†</sup>																		
Heterosexual	13.88	Ref	17.72	Ref	14.89	Ref	3.12	Ref	4.44	Ref	5.99	Ref	5.57	Ref	22.13	Ref	7.70	Ref
Gay/lesbian	22.20	1.77 (1.43, 2.19)	30.35	2.02 (1.66, 2.46)	16.48	1.13 (0.80, 1.58)	7.00	2.34 (1.58, 3.45)	5.17	1.17 (0.72, 1.91)	14.01	2.56 (1.92, 3.42)	12.55	2.43 (1.85, 3.20)	23.95	1.11 (0.88, 1.39)	9.95	1.33 (0.99, 1.77)

	Bullied Online		Bullied Offline		Carried a Weapon		Carried a Weapon at School		Carried a Gun		Avoided School/Felt Unsafe		Threatened/Injured With Weapon		Physical Fight		Physical Fight at School	
	%	OR (95% CI)	%	OR (95% CI)	%	OR (95% CI)	%	OR (95% CI)	%	OR (95% CI)	%	OR (95% CI)	%	OR (95% CI)	%	OR (95% CI)	%	OR (95% CI)
Bisexual	28.68	2.49 (2.19, 2.84)	33.76	2.37 (2.09, 2.68)	16.14	1.10 (0.95, 1.27)	4.99	1.63 (1.24, 2.15)	3.69	0.82 (0.58, 1.16)	11.39	2.02 (1.72, 2.37)	9.83	1.85 (1.53, 2.22)	27.49	1.33 (1.18, 1.51)	9.45	1.25 (1.04, 1.50)
Not sure	21.22	1.67 (1.40, 2.00)	25.40	1.58 (1.37, 1.83)	15.10	1.02 (0.81, 1.27)	6.25	2.07 (1.50, 2.85)	7.63	1.78 (1.24, 2.55)	12.45	2.23 (1.82, 2.75)	12.15	2.34 (1.89, 2.91)	24.61	1.15 (0.94, 1.40)	11.87	1.61 (1.29, 2.02)

Note: All models accounted for complex survey design.

Abbreviations: YRBS, Youth Risk Behavior Surveillance; OR, odds ratio; 95% CI, 95% confidence interval; AIAN, American Indian/Alaskan Native; API, Asian and Pacific Islander.

\* These outcomes are not mutually-exclusive and exhibit overlap.

<sup>†</sup>From 2015 to 2019 only, n = 44 066.

**Table 4.** Unadjusted Odds Ratios of Online Bullying Predicting Offline Injury/Violence-Related Behavior Outcomes, by Sex, Race/Ethnicity, and Sexual Identity, 2011 to 2019 YRBS

Characteristic	Predictor: Online Bullying	Bullied Offline OR (95% CI)	Carried a Weapon OR (95% CI)	Carried a Weapon at School OR (95% CI)	Carried a Gun OR (95% CI)	Avoided School/felt Unsafe OR (95% CI)	Threatened/ Injured With Weapon OR (95% CI)	Physical Fight OR (95% CI)	Physical Fight at School OR (95% CI)
<b>Sex</b>									
Male	Yes	12.77 (11.27, 14.48)	1.87 (1.69, 2.08)	2.37 (1.99, 2.81)	1.95 (1.57, 2.41)	4.31 (3.71, 5.01)*	5.60 (4.91, 6.38)	2.38 (2.15, 2.64)	2.98 (2.66, 3.34)*
	No	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
Female	Yes	12.54 (11.54, 13.63)	2.06 (1.84, 2.30)	2.86 (2.43, 3.36)	2.46 (1.74, 3.46)	3.31 (2.88, 3.81)*	4.80 (4.24, 5.43)	2.24 (2.05, 2.45)	2.43 (2.13, 2.78)*
	No	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
<b>Race/ethnicity</b>									
AIAN	Yes	13.49 (8.45, 21.54)	1.22 (0.73, 2.02)*	1.37 (0.58, 3.25)*	2.28 (0.50, 10.47)	2.60 (1.47, 4.62)	3.11 (1.78, 5.45)	1.93 (1.18, 3.17)*	2.83 (1.46, 5.49)*
	No	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
API	Yes	11.76 (8.69, 15.92)	1.83 (1.31, 2.57)*	2.16 (1.23, 3.78)*	2.86 (0.88, 9.35)	4.30 (2.66, 6.93)	4.79 (3.02, 7.59)	2.90 (2.18, 3.85)*	3.26 (2.14, 4.95)*
	No	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
Black	Yes	11.25 (9.24, 13.69)	2.15 (1.68, 2.74)*	2.88 (1.99, 4.18)*	2.26 (1.29, 3.98)	3.96 (3.15, 4.99)	4.62 (3.71, 5.74)	2.08 (1.70, 2.55)*	2.71 (2.16, 3.41)*
	No	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
Hispanic/Latino	Yes	14.94 (12.78, 17.47)	1.76 (1.48, 2.09)*	3.02 (2.36, 3.88)*	1.72 (1.22, 2.42)	4.21 (3.55, 4.99)	4.64 (3.95, 5.45)	2.37 (2.08, 2.71)*	2.66 (2.23, 3.18)*
	No	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
White	Yes	12.65 (11.42, 14.00)	1.06 (0.97, 1.15)*	1.48 (1.24, 1.77)*	1.48 (1.15, 1.90)	4.04 (3.49, 4.68)	4.62 (4.04, 5.29)	1.83 (1.68, 1.99)*	2.25 (1.99, 2.54)*
	No	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
Multiracial	Yes	9.58 (7.16, 12.83)	1.83 (1.34, 2.48)*	2.00 (1.22, 3.31)*	2.18 (0.98, 4.83)	3.58 (2.43, 5.26)	4.90 (3.37, 7.14)	1.76 (1.30, 2.37)*	1.50 (1.04, 2.17)*
	No	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
<b>Sexual identity<sup>†</sup></b>									
	No	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref



Characteristic	Predictor: Online Bullying	Bullied Offline OR (95% CI)	Carried a Weapon OR (95% CI)	Carried a Weapon at School OR (95% CI)	Carried a Gun OR (95% CI)	Avoided School/Felt Unsafe OR (95% CI)	Threatened/ Injured With Weapon OR (95% CI)	Physical Fight OR (95% CI)	Physical Fight at School OR (95% CI)
Heterosexual	Yes	15.47 (13.72, 17.44)*	1.24 (1.09, 1.40)*	1.65 (1.35, 2.02)	1.41 (1.13, 1.76)*	3.61 (3.09, 4.22)	4.36 (3.80, 5.01)	1.80 (1.62, 2.01)*	2.18 (1.91, 2.49)*
	No	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
Gay/lesbian	Yes	10.43 (6.56, 16.59)*	1.69 (0.89, 3.18)*	1.61 (0.73, 3.55)	2.83 (1.05, 7.59)*	2.63 (1.41, 4.89)	3.45 (2.06, 5.79)	2.26 (1.43, 3.60)*	3.35 (1.66, 6.76)*
	No	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
Bisexual	Yes	10.05 (7.99, 12.65)*	2.26 (1.67, 3.06)*	2.76 (1.65, 4.62)	1.56 (0.71, 3.39)*	2.77 (1.97, 3.91)	3.79 (2.72, 5.28)	1.92 (1.45, 2.54)*	2.04 (1.45, 2.88)*
	No	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
Not sure	Yes	11.29 (7.54, 16.91)*	2.39 (1.55, 3.70)*	3.16 (1.74, 5.71)	4.21 (2.21, 8.01)*	5.32 (3.44, 8.24)	6.84 (4.26, 10.97)	4.72 (3.31, 6.73)*	4.90 (3.11, 7.72)*
	No	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref

Note: All models accounted for complex survey design.

Abbreviations: YRBS, Youth Risk Behavior Surveillance; OR, odds ratio; 95% CI, 95% confidence interval; AIAN, American Indian/Alaskan Native; API, Asian and Pacific Islander.

\* p-Value for interaction by demographic <.05.

† From 2015 to 2019 only, n = 44 066.