



## Article

# Gendered Analysis of Cyberbullying Victimization and Its Associations with Suicidality: Findings from the 2019 Youth Risk Behavior Survey

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**Abstract:** Cyberbullying victimization (CV), a widespread experience in adolescence, is associated with increased depression and suicidality. However, few studies have taken a gender approach when investigating the association between CV and suicidality, despite research that indicates disparate experiences by gender for both CV and mental health. We conducted a secondary data analysis of the 2019 Youth Risk Behavior Survey ( $N = 10,309$ ; 50.1% girls), a cross-sectional survey drawn from a representative sample of US high school students. We found that CV remained significantly associated with suicidality after controlling for emotional and behavioral risk factors, for both boys and girls. CV increased the odds of suicidality directly and indirectly by increasing risk for depression, for both boys and girls. Boys contending with both CV and sexual violence were particularly vulnerable to suicidality, and binge drinking was positively associated with CV for girls but negatively associated with CV for boys. Findings confirmed that CV is a pervasive issue among U.S. adolescents. A gendered approach is necessary in order to understand and address the effects of CV.

**Keywords:** mental health; cyberbullying; victimization; depression; suicidality; gender



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## 1. Introduction

Cyberbullying victimization (CV), defined as being targeted by any electronic bullying (e.g., through text or social media), though a relatively new phenomenon, is recognized as a serious public health issue, compromising mental health and disproportionately affecting women and adolescents [1–3]. Understanding effects of CV on mental health is vitally important as the past decade has revealed an increase in adolescent suicidality and mental health issues generally [4], combined with a rise in Internet usage at younger ages and new social media platforms such as TikTok targeting young people [5,6]. At the same time, we need to understand this issue with a gendered lens, as data from U.S. high school students have found that 20% of girls compared with 11% of boys having experienced CV [7]. While cyberbullying can take many forms including incidents of insult, humiliation, threats, and blackmail [8–10], there are notable gender differences in the nature of these abuses. Cyberbullying of girls is more likely to be sexually aggressive in nature (e.g., calling the victim a “slut” or sharing of sexually explicit pictures) and linked to a male partner, where cyberbullying of boys is more likely to be homophobic or transphobic in nature, focused on physical threats and perpetrated by a male peer [11]. Despite this nature of cyberbullying, few studies have examined gender differences and its effects on mental health outcomes such as suicidality, the collective term for suicide-related thoughts and behaviors.

### 1.1. Cyberbullying, Suicidality, and Depression

Extensive evidence including that from national Youth Risk Behavior Survey (YRBS) data from a representative sample of U.S. high school students documents that CV is a

significant risk factor for suicidality among U.S. adolescents [12–20], with these findings holding even after accounting for known psychosocial stressors associated with suicidality such as depression, substance use, and a history of sexual violence [21–24]. Further, there is evidence that CV is more strongly linked to suicidality compared to traditional school bullying [17], a consequence likely due to the more insidious nature of cyberbullying compared with traditional bullying: perpetrators are afforded anonymity and are able to target a larger audience without the same level of fear of repercussions and digital data cannot often not be recalled once released [25]. The importance of focus on this cannot be overstated as suicide is the second leading cause of death for adolescents in the U.S. [26], with rates increasing steadily over the past decade [27,28] and indications that cyberbullying has increased in the past year under the COVID-19 pandemic [2,29] along with increased adolescent online presence [30,31].

When assessing the relationship between CV and suicidality, it is important to consider depression since there is a known link between CV and depression [32–35] and because depression is well-documented risk factor for suicidality [23,36]. Researchers have identified a link between screen time, depression, and suicidality, and called for additional research to improve our understanding and ability to intervene in this growing crisis [27]. Along with suicidality, depression has been increasing over the past decade [37], but we lack clarity on the extent to which depression is involved in the link between CV and suicidality for U.S. adolescents. A study using 2009 YRBS state-level data from Arizona found that depression partially mediated the relationship between CV and suicide attempts for girls but not for boys [38]. However, a study using 2011 national YRBS data found that observed direct effects of CV on suicidal thoughts, planning, or attempts were lost for both boys and girls once depression, substance abuse, and violent behaviors were included in the model [39], though mediation was not specifically tested. Other high school-based research similarly found that substance use and violent behavior affected the association between CV and suicidality, but here gender stratification was not conducted [40]. Consideration of depression as a mediator and adjusting for substance use and violent behavior may offer more insight along with gender stratification, given that prior research shows stronger associations between CV and suicidality for girls compared with boys [39] and stronger associations between depression and suicidal ideation for girls compared with boys [41].

### *1.2. Gendered Risks for Suicidality: Sexual Violence and Sexual Orientation*

Consideration of violence for this population, and with a gendered lens of analysis, also requires focus on sexual violence (SV), given that CV for girls is often in the form of cyber-sexual harassment, as noted above [11,42], and there are significant connections between CV and victimization from contact-based SV [43–45]. Correspondingly, we saw disproportionate burden of contact-based SV in the past year affecting high school girls according to 2019 YRBS data, reported by 17% of girls compared with 5% of boys, using a question that defined SV to include: “kissing, touching, or being physically forced to have sexual intercourse when they did not want to” [7]. Nationally representative data from US high school students also indicates that sexual violence was associated with significantly higher odds of suicidal ideation for girls, but not for boys, when controlling for other factors [46]. Given these findings, analysis of the interaction between CV and SV may affect suicidality, and these effects may be different by the gender of the respondent.

For boys, such consideration should take into account sexual orientation, given that homophobic and transphobic bullying disproportionately affects boys relative to girls and even more so for gay, lesbian, and bisexual individuals [2]. Homophobic and transphobic bullying is more often perpetrated by boys against boys, including heterosexual boys, in order to reinforce traditional gender norms, humiliate, or exert control [47,48]. This type of bullying, whether in person or online, is associated with higher psychological distress, including depression and suicidality [47,49–51]. Hence, it may be the case that while CV is more common for girls, it is a stronger risk factor for suicidality for boys because the nature of the cyberbullying for boys more often focuses on sexual orientation. Understanding

these aspects of CV and its psychological impacts are important for prevention efforts focused on both bullying and mental health.

### 1.3. Theoretical Foundations

The link between CV and suicidality is not only empirically supported, as noted above, but it is also theoretically grounded. The interpersonal theory of suicide posits that suicidality is a consequence of “perceived burdensomeness” and “thwarted belongingness” that results in a hopelessness which in turn results in thoughts of suicide [52–54]. Aligning with this theory, researchers have posited that CV can represent concretely to adolescents this perceived burdensomeness and thwarted belongingness, resulting in a depression that gives light to suicidality [40]. Empirical analysis assessing this association documented that substance use and violent behaviors can affect these associations among adolescents, though this prior study did not include consideration of depression or gender [40]. We posited based on our above review that depression is likely a mediator for this association and that gender differences may be observed in these analyses based on the above described gender differences in CV and suicidality. This analysis thus not only contributes to the growing empirical demonstration of value of this theory but also extends it by allowing for a gendered analysis.

### 1.4. Study Objectives

Building on the state of the evidence and our theoretical framework and using representative data on U.S. high school students from the 2019 YRBS, we undertook analyses to assess the relationship between CV and suicidality, the role of depression as a mediator in this relationship, and the effects of a CV–SV interaction on suicidality, as well as whether these anticipated effects differ by gender. We controlled for behavioral risk factors including violence engagement and drug and alcohol use, which are known to be associated with CV and suicidality [12,55].

### 1.5. Study Hypotheses

We hypothesized that there would be a significant positive association between CV and suicidality after controlling for depression and behavioral risk factors and that depression would mediate the association between CV and suicidality. Secondarily, we hypothesized that there would be a significant effect of the CV–SV interaction on suicidality such that those with both would be at significantly greater risk for this outcome relative to those with neither. Finally, we hypothesized that the gender-stratified analyses to assess the association between CV and suicidality would yield significant differences based on the gender of the respondent. Findings are important for guidance to school-based violence prevention and mental health promotion programming for adolescents and may be particularly important in light of return-to-school efforts following the COVID-19 pandemic under increased adolescent online activities including those for education [56] and elevation of mental health concerns [57].

## 2. Materials and Methods

A secondary data analysis was conducted using data from the 2019 Youth Risk Behavior Survey, a cross-sectional survey administered to a nationally representative sample of US high school students ( $N = 13,677$ ) [58]. Since 1991, the CDC has administered the YRBS to students in grades 9–12 biennially to gather information on health-risk behaviors that contribute to morbidity and mortality of youth and young adults. For the 2019 survey, a three-stage cluster sampling design was used to produce a sample that is representative of students in grades 9 to 12 in public and private schools in all 50 states and the District of Columbia. The sampling frame was based on datasets from the National Center for Education Statistics and Market Data Retrieval, Inc. Data for the 2019 survey were collected between August 2018 and June 2019.

### 2.1. Setting and Procedure

The protocol for the 2019 YRBS administration was approved by the CDC's Institutional Review Board [58]. A nationally representative sample of 184 schools were selected to participate. In those schools, one or two classrooms in each grade (9–12) from either a required subject or a required period were randomly selected, and all students in the selected classes were invited to participate in the study. Participation was anonymous and voluntary, and parental permission procedures were followed before survey administration. The school-based survey took approximately 45 min and was completed during one class period using a computer-scannable questionnaire booklet. Any school, classroom, or student that refused to participate in the study was not replaced. The CDC describes further details about the YRBS administration and methodology on their website [59].

The resulting 13,872 questionnaires representing 136 schools were cleaned, edited for inconsistencies, and processed for quality control. A questionnaire failed quality control when it had too few responses after editing (<20) or had the same answer for  $\geq 15$  consecutive questions. After processing, 13,677 questionnaires remained. The response rate was 75.1% for schools and 80.3% for students. A weight based on gender, race or ethnicity, and grade was applied to each student record so that weighted proportions would reflect a nationally representative sample of 9th to 12th graders in U.S. public and private schools by grade. Our analytic sample was limited to the 10,309 participants who provided data on our independent and dependent variables, CV and suicidality, as well as gender to allow for gender-stratified analyses.

### 2.2. Measures

The YRBS survey consists of 99 self-report questions, all of which are multiple choice except those assessing height, weight, and race. The survey assesses six categories of health behaviors: alcohol and other drug use, tobacco use, dietary behaviors, physical activity, sexual behaviors, and behaviors that contribute to injuries and violence. The CDC has conducted two studies to investigate the test-retest reliability of the YRBS, one in 1992 and one in 2000 [59]. Both times, the majority of items displayed moderate to high kappa statistics, and any questionable items were dropped or reworked for future studies. The CDC also reviewed existing empirical literature on cognitive and situational factors related to adolescent self-report of risk behaviors and concluded that these factors do not influence self-report equally across all behaviors [59]. More information about the validity of self-report risk behaviors can be found in a review by Brener et al. [60].

A subset of items from the YRBS were used for this study. Cyberbullying victimization (CV) was our independent variable and was assessed by the question, "During the past 12 months, have you ever been electronically bullied? (Count being bullied through texting, Instagram, Facebook, or other social media.)". Response options were "yes" or "no". Suicidality, the dependent variable, was assessed by the question, "During the past 12 months, did you ever seriously consider attempting suicide?" Response options were "yes" or "no".

Covariates in this study included both demographics and emotional-behavioral risks. We used the following self-reported demographic variables: age, gender, sexual orientation, race or ethnicity, and grade level. Age was assessed by the question, "How old are you?", with seven response options: "12 years old or younger", "13 years old", "14 years old", "15 years old", "16 years old", "17 years old", or "18 years old or older". Gender was assessed by the question, "What is your sex?", with two response options: "male" or "female". Sexual orientation was assessed by the question, "Which of the following best describes you?", with six response options: "Heterosexual (straight)", "Gay or lesbian", "Bisexual", "I describe my sexual orientation some other way", "I am not sure about my sexual orientation (questioning)", or "I do not know what this question is asking". Response options assessing sexual orientation were consolidated into four responses: heterosexual, gay or lesbian, bisexual, or not sure. Grade level was assessed by the question, "In what grade are you?", with five response options: 9th grade, 10th grade, 11th grade,

12th grade, or “ungraded or other grade”. Race was assessed by the question, “What is your race? (Select one or more responses)”, with five response options: “American Indian or Alaska Native”, “Asian”, “Black or African American”, “Native Hawaiian or Other Pacific Islander”, or “White”. Ethnicity was assessed by the question, “Are you Hispanic or Latino?”, with two response options: “yes” or “no”. Response options assessing race and ethnicity were consolidated into four responses: White, non-Hispanic; Hispanic or Latino; Black, non-Hispanic; and other races.

Emotional and behavioral risk factors included in this analysis were depressive symptoms, victimization from sexual violence, binge drinking, illicit drug use, and violence engagement. Depression was assessed by the question, “During the past 12 months, did you ever feel so sad or hopeless almost every day for two weeks or more in a row that you stopped doing some usual activities?” Response options were “yes” or “no”. Sexual violence was assessed by the question, “Have you ever been physically forced to have sexual intercourse when you did not want to?”. Response options were “yes” or “no”. Binge drinking was assessed by the question, “During the past 30 days, on how many days did you have 4 or more drinks of alcohol in a row, that is, within a couple of hours (if you are female) or 5 or more drinks of alcohol in a row, that is, within a couple of hours (if you are male)?”. Response options were “0 days”, “1 day”, “2 days”, “3 to 5 days”, “6 to 9 days”, “10 to 19 days”, or “20 or more days”. Responses were consolidated into two groups: binge drinking and not binge drinking. Illicit drug use was assessed by six separate questions that started with, “During your life, how many times have you . . .”. Illicit drugs assessed were cocaine, inhalants, heroin, methamphetamines, ecstasy, and hallucinogens. Response options were “0 times”, “1 or 2 times”, “3 to 9 times”, “10 to 19 times”, “20 to 39 times, or “40 or more times”. Responses were consolidated into two groups: ever used any illicit drug (for students who answered 1 time or more for any of the drugs) and never used any illicit drug (for students who answered 0 times for all of the illicit drugs). Finally, violence engagement was assessed by the question, “How many times were you in a physical fight?” Response options were “0 times”, “1 time”, “2 or 3 times”, “4 or 5 times”, “6 or 7 times”, “8 or 9 times”, “10 or 11 times”, or “12 or more times”. Responses were consolidated into two groups: ever been in a physical fight and never been in a physical fight.

### 2.3. Data Analysis

The analytic sample was limited to participants with data pertaining to CV, suicidality, and gender ( $N = 10,309$ ). Frequency analyses were calculated to assess sample demographic characteristics and the prevalence of CV, suicidality, and behavioral risk factors in the total sample and stratified by gender. Unweighted  $n$  and weighted percentages are presented. Then, in order to examine the mediating role of depression in the relationship between CV and suicidality, a series of binary logistic regressions were performed, as recommended by Baron and Kenny [61].

We also conducted a series of multiple logistic regression models, the first inclusive of demographics and the second inclusive of demographics and emotional and behavioral risk factors, to assess the association between CV and suicidality. A third multiple logistic regression model was conducted to assess the effects of a CV–SV interaction on suicidality. All analyses were weighted to account for survey design and were conducted both the total sample and stratified by gender. The level of significance was set at  $p < 0.05$ . Data were analyzed using SPSS 27.0.

## 3. Results

Prevalence statistics for sample demographics, CV, suicidality, and behavioral risk factors are shown in Table 1. The majority of the sample (86.2%) was between the ages of 14 and 17 years old. The sample consisted of 50.1% girls ( $n = 5333$ ) and 49.9% boys ( $n = 4976$ ). Most students identified as heterosexual (straight) (84.6%;  $n = 8216$ ), 8.8% identified as bisexual ( $n = 888$ ), 2.5% identified as gay or lesbian ( $n = 278$ ), and 4.0% reported not sure ( $n = 399$ ). Of the sample, 54.9% ( $n = 5408$ ) of students identified as White, non-Hispanic;

25.6% ( $n = 2362$ ) identified as Hispanic or Latino; 9.1% ( $n = 1220$ ) identified as Black, non-Hispanic; and 10.4% ( $n = 1099$ ) identified as other races (American Indian or Alaska Native, Asian, or Native Hawaiian or other Pacific Islander). In terms of student grade level, 26.5% ( $n = 2704$ ) were in 9th grade, 25.6% ( $n = 2813$ ) were in 10th grade, 24.2% ( $n = 2514$ ) were in 11th grade, and 23.7% ( $n = 2236$ ) were in 12th grade. In the past 12 months, 16.0% ( $n = 1644$ ) of students reported having experienced CV; 20.1% ( $n = 2211$ ) of students had seriously considered attempting suicide; and 37.5% ( $n = 3865$ ) of students reported having experienced depressive symptoms. Additionally, 10.7% ( $n = 975$ ) of students reported having ever experienced sexual violence; 14.1% ( $n = 1201$ ) were binge drinking in the past 30 days; 13.6% ( $n = 1185$ ) had ever used illicit drugs; and 21.4% ( $n = 2020$ ) had ever been in a physical fight.

**Table 1.** Characteristics of the YRBS 2019 representative sample of U.S. high school students ( $n = 10,309$ ).

	Unwt No. (Wt %) Total Sample ( $n = 10,309$ )	Unwt No. (Wt %) Female Subsample ( $n = 5333$ )	Unwt No. (Wt %) Male Subsample ( $n = 4976$ )	Chi-Square (df) <i>p</i> -Value
<b>Age</b>				
12 years or younger	19 (0.1)			
13 years old	9 (0.01)			
14 years old	1176 (11.7)			
15 years old	2613 (24.9)			
16 years old	2769 (25.7)			
17 years old	2426 (23.9)			
18 years or older	1289 (13.6)			
<b>Gender</b>				
Girls	5333 (50.1)	-	-	-
Boys	4976 (49.9)	-	-	-
<b>Sexual Orientation</b>				
Heterosexual	8216 (84.6)	3900 (77.8)	4316 (91.4)	439.80 (3)
Gay or lesbian	278 (2.5)	152 (2.8)	126 (2.3)	$p < 0.001$ ***
Bisexual	888 (8.8)	732 (14.1)	156 (3.6)	
Not sure	399 (4.0)	264 (5.4)	135 (2.7)	
<b>Race/Ethnicity</b>				
White, non-Hispanic	5408 (54.9)	2787 (54.2)	2621 (55.6)	8.22 (3)
Black, non-Hispanic	1220 (9.1)	631 (8.6)	589 (9.5)	$p < 0.05$ *
Hispanic/Latino	2362 (25.6)	1251 (26.7)	1111 (24.5)	
Other races	1099 (10.4)	568 (10.5)	531 (10.4)	
<b>Grade Level</b>				
9th grade	2704 (26.5)	1436 (26.1)	1268 (26.9)	1.10 (3)
10th grade	2813 (25.6)	1466 (25.8)	1347 (25.4)	$p = 0.78$
11th grade	2514 (24.2)	1275 (24.3)	1239 (24.1)	
12th grade	2236 (23.7)	1139 (23.8)	1097 (23.6)	
<b>CV</b>	1644 (16.0)	1104 (20.7)	540 (11.3)	183.82 (1)
				$p < 0.001$ ***
<b>Suicidality</b>	2211 (20.1)	1422 (25.2)	789 (15.0)	184.28 (1)
				$p < 0.001$ ***
<b>Depression</b>	3865 (37.5)	2499 (47.4)	1366 (27.6)	471.82 (1)
				$p < 0.001$ ***
<b>SV</b>	975 (10.7)	733 (16.6)	242 (4.9)	361.01 (1)
				$p < 0.001$ ***
<b>Binge Drinking</b>	1201 (14.1)	662 (15.1)	539 (13.1)	8.40 (1)
				$p < 0.01$ **
<b>Illicit Drug Use</b>	1185 (13.6)	567 (13.2)	618 (14.0)	1.39 (1)
				$p = 0.24$
<b>Violence Engagement</b>	2020 (21.4)	756 (15.1)	1264 (27.9)	253.058 (1)
				$p < 0.001$ ***

\*  $p < 0.05$ ; \*\*  $p < 0.01$ ; \*\*\*  $p < 0.001$ .

### 3.1. Mediation Analyses

Figure 1a–c presents the results of the mediation analyses as a series of logistic regressions. In the total sample (Figure 1a), we first looked at the association between CV and depressive symptoms (OR = 4.12, 95% CI = 3.70–4.58) and the association between depressive symptoms and suicidality (OR = 14.14, 95% CI = 12.53–15.95), finding significant associations in both models. Subsequently, we looked at the simple association between CV and suicidality (OR = 3.55, 95% CI = 3.18–3.96) and the same model adjusted for depressive symptoms (AOR = 1.98, 95% CI = 1.75–2.24), again finding that both models were significant but the adjusted model was significantly attenuated, as shown by non-overlapping confidence intervals. Models demonstrated direct and indirect associations between CV and suicidality, with depressive symptoms partially mediating the relationship between CV and suicidality.

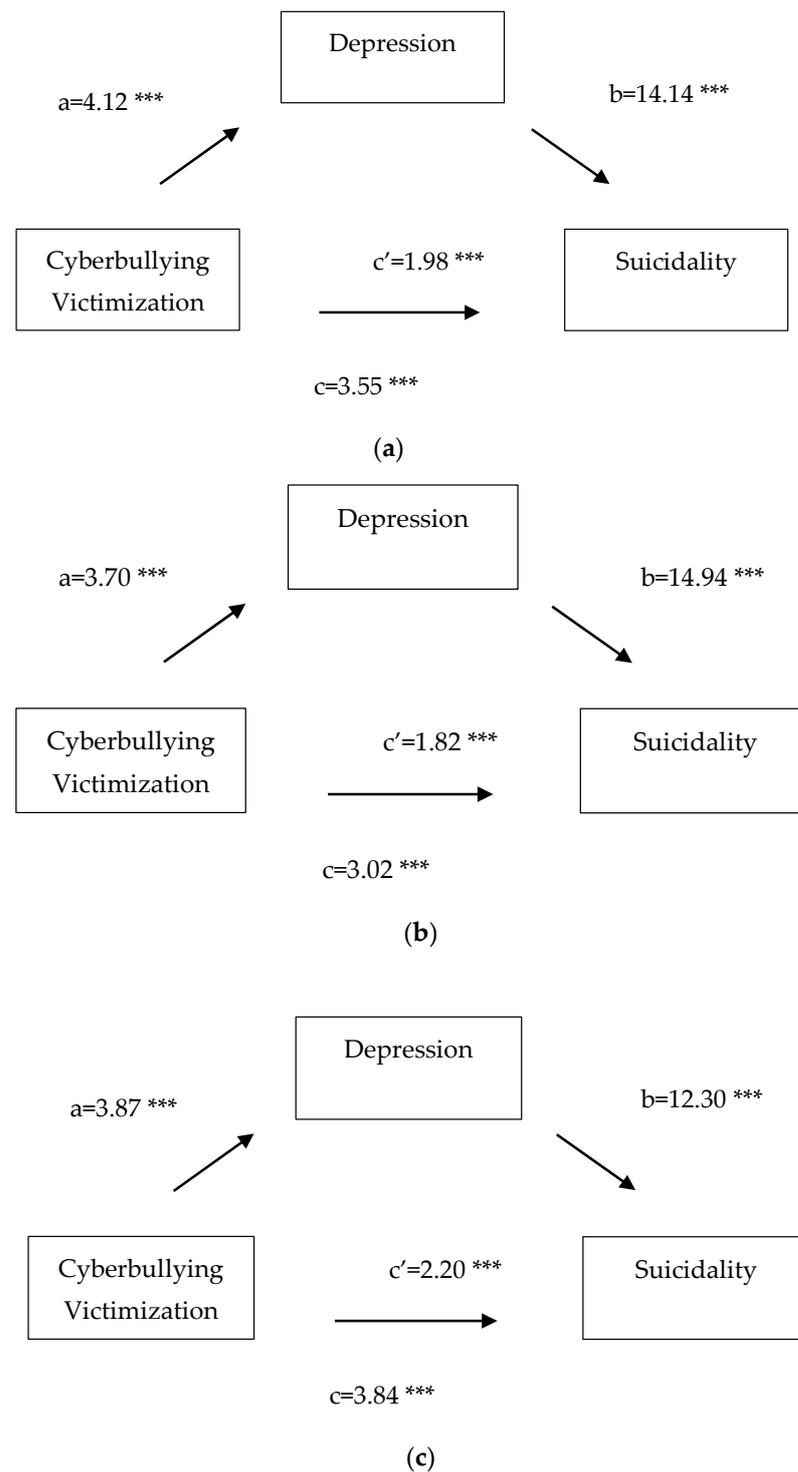
Similar findings were shown in the mediation analysis for girls. (See Figure 1b) We found significant associations between CV and depressive symptoms (OR = 3.70, 95% CI = 3.21–4.26) and between depressive symptoms and suicidality (OR = 14.94, 95% CI = 12.55–17.79). We found significant associations between CV and suicidality in our crude model (OR = 3.02, 95% CI = 2.64–3.46) as well as in our model adjusted for depressive symptoms (AOR = 1.82, 95% CI = 1.56–2.13), again with indication of direct and indirect effects of CV on suicidality and depressive symptoms being a partial mediator.

Significant mediation effects were also seen for boys. (See Figure 1c) Again, CV was significantly associated with depressive symptoms (OR = 3.87, 95% CI = 3.26–4.58), and depressive symptoms were significantly associated with suicidality (OR = 12.30, 95% CI = 10.36–14.61). CV was also significantly associated with suicidality in crude analysis (OR = 3.84, 95% CI = 3.19–4.61) and in the model adjusted for depressive symptoms, again with attenuated findings (AOR = 2.20, 95% CI = 1.78–2.71).

### 3.2. Logistic Multiple Regression

Table 2a–c presents the results of the logistic multiple regression analyses that assessed whether the demonstrated association between CV and suicidality remained significant after adjusting for demographics and behavioral risk factors for the total sample, the female subsample, and the male subsample, respectively. For the total sample, the female subsample, and the male subsample, the adjusted multivariate models continued to demonstrate a significant association between CV and suicidality, both (1) inclusive of demographics only (total sample: AOR = 3.18, 95% CI = 2.82–3.59; female subsample: AOR = 3.07, 95% CI = 2.64–3.58; male subsample: AOR = 3.53, 2.89–4.32) and (2) inclusive of demographics and emotional and behavioral risk factors (total sample: AOR = 1.64, 95% CI = 1.39–1.93; female subsample: AOR = 1.71, 95% CI = 1.39–2.10; male subsample: AOR = 1.71, 95% CI = 1.30–2.26). However, the final model inclusive of emotional and behavioral risks demonstrated attenuated findings relative to other adjusted and crude models, corresponding with above mediation analysis findings.

In the final model inclusive of CV, demographics, and emotional and behavioral risks factors, all behavioral risk factors except binge drinking remained significantly associated with suicidality in the total sample. However, differences were found between the female subsample and the male subsample. In the final model for girls, both binge drinking and sexual violence were significantly associated with suicidality while in the final model for boys, binge drinking was negatively associated with suicidality and sexual violence was not significantly associated with suicidality.



**Figure 1.** (a) Standardized regression coefficients for the relationship between cyberbullying victimization and suicidality as mediated by depression, among a representative sample of U.S. high school students ( $n = 10,309$ )  $p < 0.001$  \*\*\*. (b) Standardized regression coefficients for the relationship between cyberbullying victimization and suicidality as mediated by depression, among a representative sample of U.S. high school students, female subsample ( $n = 5333$ ).  $p < 0.001$  \*\*\*. (c) Standardized regression coefficients for the relationship between cyberbullying victimization and suicidality as mediated by depression, among a representative sample of U.S. high school students, male subsample ( $n = 4976$ )  $p < 0.001$  \*\*\*.

**Table 2.** (a) Simple logistic regression and logistic multiple regression results for the relationship between CV and suicidality by demographic and behavioral risks among a representative sample of U.S. high school students ( $n = 10,309$ ). (b) Simple logistic regression and logistic multiple regression results for the relationship between CV and suicidality by demographic and behavioral risks among a representative sample of U.S. high school students, female subsample ( $n = 5333$ ). (c) Simple logistic regression and logistic multiple regression results for the relationship between CV and suicidality by demographic and behavioral risks among a representative sample of U.S. high school students, male subsample ( $n = 4976$ ).

	OR (95% CI) <i>p</i> Value	Model 1 AOR (95% CI) <i>p</i> Value	Model 2 AOR (95% CI) <i>p</i> Value
(a)			
<b>CV</b>	3.55 (3.18, 3.96) <i>p</i> < 0.001 ***	3.18 (2.82, 3.59) <i>p</i> < 0.001 ***	1.64 (1.39, 1.93) <i>p</i> < 0.001 ***
<b>Gender</b>			
Boys (ref)	-	-	-
Girls	-	1.41 (1.26, 1.57) <i>p</i> < 0.001 ***	1.10 (0.95, 1.27) <i>p</i> = 0.23
<b>Sexual Orientation</b>			
Heterosexual (ref)	-	-	-
Gay or lesbian	-	3.97 (3.06, 5.14) <i>p</i> < 0.001 ***	3.47 (2.44, 4.92) <i>p</i> < 0.001 ***
Bisexual	-	4.95 (4.26, 5.75) <i>p</i> < 0.001 ***	3.78 (3.11, 4.60) <i>p</i> < 0.001 ***
Not sure	-	2.71 (2.18, 3.37) <i>p</i> < 0.001 ***	2.48 (1.85, 3.32) <i>p</i> < 0.001 ***
<b>Race/Ethnicity</b>			
White (ref)	-	-	-
Black	-	1.26 (1.04, 1.51) <i>p</i> < 0.05 *	1.28 (0.99, 1.64) <i>p</i> = 0.06
Hispanic/Latino	-	1.01 (0.89, 1.14) <i>p</i> = 0.91	0.80 (0.68, 0.94) <i>p</i> < 0.01 **
Other races	-	1.35 (1.15, 1.59) <i>p</i> < 0.001 ***	1.40 (1.13, 1.74) <i>p</i> < 0.01 **
<b>Grade Level</b>			
9th grade (ref)	-	-	-
10th grade	-	1.06 (0.91, 1.22) <i>p</i> = 0.47	0.95 (0.78, 1.14) <i>p</i> = 0.56
11th grade	-	1.09 (0.94, 1.27) <i>p</i> = 0.24	0.99 (0.81, 1.19) <i>p</i> = 0.88
12th grade	-	1.17 (1.01, 1.35) <i>p</i> < 0.05 *	0.98 (0.81, 1.19) <i>p</i> = 0.85
<b>Depression</b>	-	-	11.14 (9.50, 13.05) <i>p</i> < 0.001 ***
<b>SV</b>	-	-	1.55 (1.27, 1.88) <i>p</i> < 0.001 ***
<b>Binge Drinking</b>	-	-	1.12 (0.93, 1.34) <i>p</i> = 0.25
<b>Illicit Drug Use</b>	-	-	2.00 (1.66, 2.41) <i>p</i> < 0.001 ***
<b>Violence Engagement</b>	-	-	1.67 (1.42, 1.96) <i>p</i> < 0.001 ***

Table 2. Cont.

	OR (95% CI) <i>p</i> Value	Model 1 AOR (95% CI) <i>p</i> Value	Model 2 AOR (95% CI) <i>p</i> Value
(b)			
CV	3.02 (2.64, 3.46) <i>p</i> < 0.001 ***	3.07 (2.64, 3.58) <i>p</i> < 0.001 ***	1.71 (1.39, 2.10) <i>p</i> < 0.001 ***
<b>Sexual Orientation</b>			
Heterosexual (ref)	-	-	-
Gay or lesbian	-	4.53 (3.21, 6.40) <i>p</i> < 0.001 ***	4.25 (2.67, 6.78) <i>p</i> < 0.001 ***
Bisexual	-	4.33 (3.65, 5.14) <i>p</i> < 0.001 ***	3.15 (2.52, 3.95) <i>p</i> < 0.001 ***
Not sure	-	2.60 (2.00, 3.38) <i>p</i> < 0.001 ***	2.37 (1.67, 3.35) <i>p</i> < 0.001 ***
<b>Race/Ethnicity</b>			
White (ref)	-	-	-
Black	-	1.51 (1.18, 1.93) <i>p</i> < 0.001 ***	1.68 (1.20, 2.34) <i>p</i> < 0.01 **
Hispanic/Latino	-	1.11 (0.95, 1.31) <i>p</i> = 0.19	0.89 (0.72, 1.09) <i>p</i> = 0.26
Other races	-	1.42 (1.14, 1.77) <i>p</i> < 0.05 *	1.74 (1.30, 2.34) <i>p</i> < 0.001 ***
<b>Grade Level</b>			
9th grade (ref)	-	-	-
10th grade	-	1.01 (0.83, 1.21) <i>p</i> = 0.95	0.84 (0.66, 1.08) <i>p</i> = 0.17
11th grade	-	0.98 (0.81, 1.19) <i>p</i> = 0.87	0.84 (0.65, 1.08) <i>p</i> = 0.17
12th grade	-	1.09 (0.90, 1.31) <i>p</i> = 0.40	0.88 (0.68, 1.14) <i>p</i> = 0.35
Depression	-	-	13.08 (10.36, 16.51) <i>p</i> < 0.001 ***
SV	-	-	1.60 (1.28, 1.99) <i>p</i> < 0.001 ***
Binge Drinking	-	-	1.46 (1.15, 1.85) <i>p</i> < 0.01 **
Illicit Drug Use	-	-	1.61 (1.25, 2.07) <i>p</i> < 0.001 ***
Violence Engagement	-	-	1.65 (1.30, 2.09) <i>p</i> < 0.001 ***
(c)			
CV	3.84 (3.19, 4.61) <i>p</i> < 0.001 ***	3.53 (2.89, 4.32) <i>p</i> < 0.001 ***	1.71 (1.30, 2.26) <i>p</i> < 0.001 ***
<b>Sexual Orientation</b>			
Heterosexual (ref)	-	-	-
Gay or lesbian	-	3.31 (2.21, 4.97) <i>p</i> < 0.001 ***	2.82 (1.62, 4.91) <i>p</i> < 0.001 ***
Bisexual	-	7.71 (5.64, 10.56) <i>p</i> < 0.001 ***	7.89 (5.13, 12.12) <i>p</i> < 0.001 ***
Not sure	-	2.87 (1.96, 4.20) <i>p</i> < 0.001 ***	2.63 (1.51, 4.58) <i>p</i> < 0.001 ***
<b>Race/Ethnicity</b>			
White (ref)	-	-	-
Black	-	1.01 (0.75, 1.35) <i>p</i> = 0.97	0.96 (0.65, 1.43) <i>p</i> = 0.85
Hispanic/Latino	-	0.89 (0.73, 1.09) <i>p</i> = 0.27	0.74 (0.57, 0.96) <i>p</i> < 0.05 *
Other races	-	1.27 (0.99, 1.64) <i>p</i> = 0.06	1.16 (0.84, 1.61) <i>p</i> = 0.37

**Table 2.** *Cont.*

	OR (95% CI) <i>p</i> Value	Model 1 AOR (95% CI) <i>p</i> Value	Model 2 AOR (95% CI) <i>p</i> Value
<b>Grade Level</b>			
9th grade (ref)	-	-	-
10th grade	-	1.13 (0.90, 1.43) <i>p</i> = 0.29	1.08 (0.80, 1.46) <i>p</i> = 0.63
11th grade	-	1.27 (1.01, 1.60) <i>p</i> < 0.05 *	1.22 (0.91, 1.65) <i>p</i> = 0.19
12th grade	-	1.29 (1.03, 1.62) <i>p</i> < 0.05 *	1.10 (0.81, 1.48) <i>p</i> = 0.54
<b>Depression</b>	-	-	9.36 (7.48, 11.72) <i>p</i> < 0.001 ***
<b>SV</b>	-	-	1.38 (0.89, 2.14) <i>p</i> = 0.15
<b>Binge Drinking</b>	-	-	0.72 (0.53, 0.99) <i>p</i> < 0.05 *
<b>Illicit Drug Use</b>	-	-	2.63 (1.99, 3.48) <i>p</i> < 0.001 ***
<b>Violence Engagement</b>	-	-	1.82 (1.44, 2.29) <i>p</i> < 0.001 ***

\* *p* < 0.05; \*\* *p* < 0.01; \*\*\* *p* < 0.001.

**3.3. CV and Sexual Violence Interaction Effects**

We found a significant CV–SV interaction effect in our model with the total sample (*p* < 0.05), then conducted a model with a CV–SV categorized variable (SV only, CV only, CV + SV, and none (ref)). While all categories were significantly more likely to report suicidality than those with neither CV nor SV, those with CV and SV were significantly more likely than participants with a history of SV only or CV only to report suicidality, as indicated by non-overlapping confidence intervals. (See Table 3a). However, in gender-stratified analyses, we found this significant interaction held for boys but not girls. (See Table 3b,c). Further, in the gender-stratified models with the CV–SV categorized variable allowing for comparison of those with CV + SV, CV only, and SV only to those with neither CV nor SV, effects were significantly stronger for boys than girls across all categories. For the CV + SV category compared with neither CV nor SV, boys were 7.39x more likely to report suicidality (95% CI = 4.50–12.14) whereas girls were 3.65x as likely to report suicidality (95% CI = 2.77–4.81). For those reporting CV only versus neither CV nor SV, boys were 2.50x as likely to report suicidality (95% CI = 1.85–3.38) whereas girls were 1.32x as likely (95% CI = 1.05–1.66). For those reporting SV only versus neither CV nor SV, boys were 3.66x as likely to report suicidality (95% CI = 2.49–5.39) whereas girls were 1.50x as likely (95% CI = 1.17–1.92).

**Table 3.** (a) Logistic multiple regression results to assess the effect of the CV–SV interaction on suicidality among a representative sample of U.S. high school students (*n* = 10,309). (b) Logistic multiple regression results to assess the effect of the CV–SV interaction on suicidality among a representative sample of U.S. high school students, female subsample (*n* = 5333). (c) Logistic multiple regression results to assess the effect of the CV–SV interaction on suicidality among a representative sample of U.S. high school students, male subsample (*n* = 4976).

	Model 1 AOR (95% CI) <i>p</i> Value	Model 2 AOR (95% CI) <i>p</i> Value
(a)		
CV	3.28 (2.85, 3.76) <i>p</i> < 0.001 ***	-

Table 3. Cont.

	Model 1 AOR (95% CI) <i>p</i> Value	Model 2 AOR (95% CI) <i>p</i> Value
SV	4.07 (3.43, 4.81) <i>p</i> < 0.001 ***	-
CV × SV	0.71 (0.54, 0.95) <i>p</i> < 0.05 *	-
Neither CV nor SV (ref)	-	-
SV only (No CV)	-	2.10 (1.71, 2.58) <i>p</i> < 0.001 ***
CV only (No SV)	-	1.69 (1.41, 2.03) <i>p</i> < 0.001 ***
Both CV and SV	-	4.90 (3.86, 6.22) <i>p</i> < 0.001 ***
<b>(b)</b>		
CV	2.70 (2.25, 3.24) <i>p</i> < 0.001 ***	-
SV	3.07 (2.51, 3.75) <i>p</i> < 0.001 ***	-
CV × SV	0.90 (0.64, 1.26) <i>p</i> = 0.55	-
Neither CV nor SV (ref)	-	-
SV only (No CV)	-	1.50 (1.17, 1.92) <i>p</i> = 0.001 **
CV only (No SV)	-	1.32 (1.05, 1.66) <i>p</i> < 0.05 *
Both CV and SV	-	3.65 (2.77, 4.81) <i>p</i> < 0.001 ***
<b>(c)</b>		
CV	3.83 (3.09, 4.74) <i>p</i> < 0.001 ***	-
SV	5.61 (4.06, 7.76) <i>p</i> < 0.001 ***	-
CV × SV	0.53 (0.30, 0.94) <i>p</i> < 0.05 *	-
Neither CV nor SV (ref)	-	-
SV only (No CV)	-	3.66 (2.49, 5.39) <i>p</i> < 0.001 ***
CV only (No SV)	-	2.50 (1.85, 3.38) <i>p</i> < 0.001 ***
Both CV and SV	-	7.39 (4.50, 12.14) <i>p</i> < 0.001 ***

\* *p* < 0.05; \*\* *p* < 0.01; \*\*\* *p* < 0.001.

#### 4. Discussion

In this study, we investigated the association between CV and suicidality, the extent to which depression acts as a mediator in this relationship, and the effects of a CV–SV interaction on suicidality, as well as whether these effects differed by gender, using cross-sectional data from a nationally representative sample of U.S. high school students. Results confirmed that CV is a pervasive concern, with approximately one in six students reporting CV in the past 12 months. We found that CV was significantly associated with suicidality even after controlling for various emotional and behavioral risk factors including substance use and depressive symptoms; these results are consistent with previous studies [21–24]. We also found that CV increased the odds of suicidality both directly and indirectly by increasing risk for depressive symptoms, for both girls and boys; these findings differ from research using 2009 data from Arizona which found partial mediation of depression

in the CV and suicidality relationship only for female students [38]. Since neither CV rates [62] nor depression rates [63] for adolescent boys have changed significantly in the past decade, one possibility for the inconsistent findings across the two studies is that the positive association between CV and depression may be strengthening over time. More recent research confirmed our finding that CV is associated with psychological distress (i.e., depression and anxiety) for adolescent boys in addition to girls [64].

While the CV and suicidality association appeared to be similar by gender in our analyses, there were important differences, particularly with regard to SV. While our adjusted models indicated that SV was significantly associated with suicidality for girls but not for boys, our models examining the effects of a CV–SV interaction demonstrated a significant interaction for boys but not girls. Boys contending with both SV and CV were particularly vulnerable to suicidality. Adjusted models may mask this vulnerability for boys. These findings highlight the important role SV has on risk for suicidality for youth, but perhaps in ways that differ by gender, which is supported by other research that shows that male adolescents with sexual assault histories had higher suicide risk than female adolescents with sexual assault histories [65]. These findings demonstrate the importance of recognizing that boys as well as girls can be vulnerable to violence, including SV, and its mental health consequences.

For both boys and girls, we found that adjusting for emotional and behavioral risks attenuated the association between CV and suicidality but again with some notable gender differences. As noted above, depression was the strongest correlate associated with suicidality for both boys and girls, and illicit drug use and fighting were significant correlates for both as well. These findings correspond with other research documenting associations between emotional and behavioral risks associated with suicidality [64]. However, while binge alcohol was associated with higher odds of suicidality for girls, it was negatively associated with suicidality for boys. This corresponds with other research suggesting that binge drinking carries more negative consequences for girls than boys [66], but less clear is why it would be protective for boys. It may be a marker for socializing among boys, and that may be what creates the observed protective effect. Lack of a social support measure in YRBS impedes our ability to test this, and future YRBS efforts may benefit from expansion of measures on mental health and social support.

### *Limitations*

Findings should be considered in light of study limitations. One limitation is that we cannot use the results to infer causality due to the cross-sectional nature of the data. Future studies should use longitudinal data collection methods to assess the presence of a causal relationship between CV and suicidality. Additionally, the data relied on self-report and therefore may have been subject to recall bias or social desirability bias. Future studies should use multiple sources of data such as surveys with parents, teachers, or peers in order to triangulate findings. Another limitation is the lack of transgender status data. Although some school sites asked questions about gender identity on local YRBS surveys, the national survey did not; therefore, national prevalence estimates cannot be assessed from this dataset. This is an important point for studies involving suicidality, as transgender youth risk for suicide attempts may exceed that of LGB youth [67]. Additional studies should also investigate the unique experiences of American Indian or Alaska Native, Asian, and Native Hawaiian or other Pacific Islander students regarding mental health and CV.

A few limitations are specific to the survey questions used in the analyses presented in this study. For purposes of this study, the construct of depression relied on one question that assessed feelings of sadness or hopelessness. Sadness and hopelessness are criteria for clinical depression according to the DSM-V [68], but they alone are not sufficient for a diagnosis. In order to be diagnosed with depression, at least five symptoms must be experienced within a two-week period; other symptoms include loss of interest or pleasure, fatigue, and insomnia or hypersomnia, among others. Furthermore, evidence suggests that there are cultural variations in depressive symptomology [69]. Future studies should use

measures that account for the spectrum of depressive symptoms in order to more accurately represent this construct within and across cultures. Meanwhile, though reports of CV have remained stable over the past decade [37], we cannot exclude the possibility that survey terminology has become outdated. Future research should consider the changing landscape of social media use when designing and conducting studies on CV to ensure that methods are up-to-date and relevant for the adolescent population [70].

As Hinduja and Patchin [15] explained, CV tends to exacerbate instability for adolescents who are already struggling with stressful environments. We second their call for future research to assess the contributive nature of how stressful experiences lead to adverse outcomes. In particular, mixed methods research can enhance understanding of the dynamics between CV and suicidality by incorporating qualitative data that captures students' experiences. Finally, we need research to identify buffers or protective mechanisms that can mitigate the adverse effects of CV on student mental health. For example, in a recent study involving 1660 Spanish adolescents, emotional intelligence was found to act as a buffer in the association between CV and suicidal ideation, such that cyberbullying victims with high emotional intelligence reported lower suicidal ideation than their less emotionally intelligent peers [71]. Buffers like emotional intelligence can be targeted in new prevention and intervention efforts.

## 5. Conclusions

In a society in which adolescent mental health issues are steadily on the rise, we need to continuously update our understanding of the relationship between peer behaviors and mental health in order to develop and provide effective prevention and intervention programs for youth. Increasing use of digital technology is giving rise to growing peer engagement through technology, including negative engagement such as cyberbullying. This study offered a first-time analysis of CV and suicidality with depression as a mediator, using a gender-stratified analysis with a nationally representative data set. Consequently, results offered insights from both a developmental and gendered vulnerability consideration.

The current study contributes to the literature by demonstrating a significant association between cyberbullying victimization (CV) and suicidality and depression a mediator in this association among a representative sample of U.S. high school students. Secondly, we saw an important sexual violence (SV)–CV interaction on the relationship between CV and suicidality, and while this held true for boys and girls, effects were stronger for boys, an important finding given lower prevalence of both CV and SV for boys compared with girls.

Our findings have important implications for policy and practice aimed at reducing cyberbullying and improving adolescent mental health. Adolescent victims of cyberbullying should be screened for depression and suicidality to better support these vulnerable populations and reduce their mental health risks. Providers should also be aware of how sexual violence victimization can compound mental health risks, particularly for boys. For larger-scale initiatives, cyberbullying prevention and intervention programs should contain a suicide prevention and intervention component for high school students. Additionally, schools may benefit from using approaches that address and improve school climate; whether schools are safe, caring, and responsive plays a significant role in reducing bullying behavior and mental health issues [72]. Finally, because the relationship between CV and suicidality remained significant when controlling for demographic variables, these initiatives should be implemented broadly to high school students of all backgrounds. Overall, this study emphasizes the importance of integrating violence prevention and mental health programming for adolescents and highlights that schools may be an important context in which to provide programs for youth in need.

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**Data Availability Statement:** YRBS data can be found at <https://www.cdc.gov/healthyouth/data/yrebs/data.htm> (accessed on 14 September 2021).

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