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Bullying Victimization and Associations With Substance Use Among US Middle School Students: 2019 Youth Risk Behavior Survey

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Human Subjects Statement

Preparation of this paper did not involve primary research or data collection involving human subjects, and therefore, no institutional review board examination or approval was required.

Conflict of Interest

The authors declare no conflict of interest.

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Abstract

BACKGROUND: Research shows associations between bullying victimization and substance use for teens. However, more research about this relationship for younger adolescents and across race/ethnicity is needed.

METHODS: Prevalence and pooled logistic regression analyses of 2019 Middle School Youth Risk Behavior Survey data from 13 states (N = 74,059 students) examined associations between self-reported bullying victimization (at school, electronically, and both) and having ever tried cigarette smoking, alcohol, or marijuana; used an electronic vapor product; or misused prescription pain medicine. Regression analyses were adjusted by age and sex/race/ethnicity.

RESULTS: All 3 measures of bullying victimization were significantly associated ($p < .05$) with the 5 substance use behaviors examined (adjusted prevalence ratios ranged from 1.29 to 2.32). These associations held across sexes. Significant associations were found within all 7 race/ethnicity categories, with the most associations reported for the non-Hispanic (NH) white, NH black or African American, Hispanic/Latino, and NH Asian groups.

CONCLUSION: The association between bullying and substance use by middle school is a highly relevant issue to consider as students return to classrooms.

Keywords

middle school; bullying; substance use.

Bullying among children and adolescents is a form of violence associated with poor physical and mental health, as well as negative psychosocial outcomes that result in both immediate and long-term impacts.¹⁻³ In 2019, it was estimated that 19.5% of US high school students were bullied on school property and 15.7% were bullied electronically in the past 12 months.⁴ Rates of bullying appear to be unchanged over the last decade, with no declines in bullying victimization observed between 2011 and 2019.⁵

Bullying victimization has also been associated with problem behaviors including substance use among children and teens.⁶⁻¹² However, most of these studies are focused on high school aged youth and primarily find associations for the female group. The smaller number of studies on this topic including middle school aged students consider few race/ethnicity

subgroups,^{8–10} despite evidence that racial and ethnic differences in violence victimization, as well as associated negative health conditions, exist.¹³ One study from 2009 found that among 926 6th through 8th grade students in California there were similar physical bullying rates across racial/ethnic subgroups.¹⁰ Existing longitudinal studies showing that childhood bullying is predictive of substance use have found outcomes in late adolescence and adulthood.^{11,12} To date, no nationally representative study has been completed on bullying victimization and substance use among US middle school students. Studies showing the link between bullying and substance use at an earlier age could help support earlier intervention among youth. Furthermore, evidence from more diverse racial/ethnic categories of students could help to support the development of culturally tailored strategies, which have been suggested to help advance health equity.^{14,15}

Data from the 2019 Youth Risk Behavior Survey (YRBS) suggest that some forms of substance use are increasing among younger age groups. For example, 9th grade students are reporting increased use of vaping products and misuse of prescription pain medicine.¹⁶ Furthermore, youth's perception of the harm of using some substances, including cannabis and prescription pain medicines, has decreased in recent years.¹⁷ Combined with the simultaneous proliferation of counterfeit pills containing illicitly manufactured fentanyl that may be marketed towards youth,^{18,19} and state policies legalizing cannabis use among adults that could inadvertently increase youth's access to these drugs,²⁰ this raises concerns about whether youth exposed to bullying at younger ages may turn to substances to cope with their problems, or if bullying exposure in and of itself may portend increased risk for substance use through other indirect pathways.

The Youth Risk Behavior Surveillance System is a system of surveys including a national school-based survey conducted by Centers for Disease Control and Prevention and state, territorial, tribal, and local surveys conducted by state, territorial, and local education and health agencies and tribal governments. These surveys monitor 6 categories of health-related behaviors that contribute to the leading causes of death and disability among youth and adults.²¹ The Middle School YRBS is a YRBS conducted every 2 years by interested states, territories and freely associated states, tribal governments, and local school districts. The Middle School YRBS is administered in the same year and uses similar, but sometimes slightly modified, questions from the High School YRBS. The Middle School YRBS questionnaire for 2019 is available online,²² along with a combined dataset with data from all states that reported representative data during each year of administration.²³ To examine bullying victimization and substance use behaviors among US middle school students, we chose to analyze the most recent data from the Middle School YRBS Combined Dataset (from year 2019). These data have not yet been analyzed together, with only state-level estimates provided online. Although data for the Middle School YRBS conducted in 2021 are expected to be available in spring of 2023, it remains important to summarize the pre-pandemic data on this topic from 2019 due to its relevance to in-person learning, and potential to serve as a baseline for post-pandemic trends.

METHODS

Participants

This study used data from the publicly available 2019 YRBS Middle School Combined Dataset. We pooled representative samples from students in public schools surveyed in the 13 (of 15) states that reported representative data including YRBS's bullying (at-school and electronic) victimization questions (Table 1 footnote § lists these states). These 13 states also all included questions about the age that the student first tried alcohol and marijuana. Twelve of these 13 states also asked questions about having ever used an electronic vapor product (EVP; see Table 1 footnote ¶) or having ever misused prescription pain medicine (Table 1 footnote #). Nine of these 13 states asked a question about the age that a student first tried cigarette smoking (Table 1 footnote ||).

Instrumentation

For the predictors, we used 2 existing binary variables in the dataset reflecting “yes” responses to ever experiencing bullying victimization at school or electronically, and we created a combined measure for students answering “yes” to both questions. For the outcomes, we used existing binary variables about having ever used an EVP or having ever misused prescription pain medicine. We also created new binary variables for ever having tried cigarette smoking, alcohol, or marijuana, using the questions about the age that the student first tried these substances (ie, the “never” tried the substance answer was coded 0, and all age range answers for having tried the substance were coded 1). A 2-category sex (female, male) and a 7-category race/ethnicity (non-Hispanic [NH] American Indian/Alaska Native (AIAN), NH Asian, NH black or African American, Hispanic/Latino, NH Hawaiian/Pacific Islander (NHPI), NH white, NH Multiple Races) variable were already included in the dataset. Since substance use initiation rates increase during adolescence,²⁴ for an adjustment variable, we recoded the existing 7-category age variable into 3 categories with sufficient cell sizes: ages 11 and younger, 12–13, and 14 and older.

Procedure

We used the primary sampling unit, stratum, and weighting variables from the dataset to calculate pooled prevalence estimates for the bullying victimization predictors and substance use outcomes, for all students and for sex and race/ethnicity subgroups. Logistic regression models were next used to generate prevalence ratios for each measure of bullying victimization with each substance use outcome, adjusted by age group, sex, and race/ethnicity.

Data Analysis

We report significant associations when $p < .05$. All analyses were performed in SAS version 9.4, using SUDAAN version 11.0.3 to account for YRBS's weighting and complex survey design. SUDAAN applied listwise deletion for missing data in the logistic regression models.

RESULTS

Tables 1 and 2 provide the prevalence of bullying victimization and substance use in the overall sample (N = 74,059 students) and by sex and race/ethnicity. Table 3 provides the results of the adjusted logistic regression models, overall and stratified by sex and race/ethnicity.

Prevalence for all students was 42.11% for at-school bullying victimization, 22.65% for electronic bullying victimization, and 17.03% for the combined measure (at-school and electronically). Across all students in the sample, having ever used an EVP was 22.20%, having ever tried alcohol was 21.34%, having ever tried cigarette smoking was 9.38%, having ever tried marijuana was 8.94%, and having ever misused prescription pain medicine was 7.87% (Table 1). The adjusted logistic regression analyses determined that all 3 measures of bullying victimization were significantly associated with each of the 5 substance use behaviors examined (Table 3). Adjusted prevalence ratios (aPRs) ranged from 1.70 to 2.19 for having ever tried cigarette smoking; 1.41 to 1.91 for having ever tried alcohol; 1.29 to 2.13 for having ever tried marijuana; 1.36 to 1.90 for having ever used an EVP; and 1.73 to 2.32 for having ever misused prescription pain medicine. Across Table 3, the aPRs for the 2 measures including electronic bullying victimization were often close to or exceeded 2.

In addition, the female and male groups had a prevalence of 47.22% and 37.28% for at-school bullying victimization; 28.92% and 16.72% for electronic bullying victimization; and 22.26% and 12.08% for the combined measure, respectively (Table 1). In the adjusted models stratified by sex, the associations between bullying and substance use held for male and female students, with the exception of the association of having ever been bullied at school and having ever tried marijuana among male students (Table 3).

Prevalence for measures of bullying victimization and substance use for the 7 race/ethnicity groups examined are shown in Table 2. In the adjusted models stratified by race/ethnicity, we found significant associations between bullying victimization and substance use behaviors for all 7 race/ethnicity categories examined (Table 3). All 15 associations tested were significant for the NH white group, followed by the NH black or African American, Hispanic/Latino, and NH Asian groups, with 14 significant associations each. The Multiple Races group and NH AIAN groups each had 9 significant associations, and NH NHPI group had 6 significant associations. Although the NH AIAN and NH NHPI groups had fewer significant associations across outcomes, all 3 bullying victimization measures were significantly associated with having ever tried alcohol for the NH AIAN group, and with having ever tried marijuana and having ever misused prescription pain medicine for the NH NHPI group.

DISCUSSION

This study suggests that experiencing bullying victimization is associated with substance use behaviors as early as middle school. Our findings add to previous research on this topic, which primarily finds associations for female youth, lacks diversity in the race/ethnicity

categories examined, is limited to 1 setting, and/or focuses on outcomes in late adolescence and adulthood.^{6–12}

Implications for School Health Policy, Practice, and Equity

These findings have implications for prevention and intervention strategies. Although bullying rates are mostly staying the same among high school aged youth,⁵ our study results are consistent with past YRBS results finding higher rates of bullying behaviors reported by middle school students.²⁵ In addition, increasing rates of EVP use and prescription pain medicine misuse, misperceptions about the harms associated with substance use among youth,¹⁶ and a larger context that may be contributing to youth drug use,^{17–20} make now an important time for prevention. Middle schools could consider implementing prevention strategies addressing bullying and substance use, jointly or separately, recognizing the association between these risk behaviors. Evidence informed approaches for violence prevention in school settings could be implemented, including increasing school connectedness and creating a protective culture.²⁶

In this study, the female and male groups demonstrated a nearly equal number of significant associations across measures of bullying victimization and substance use (Table 3), suggesting the importance of including both groups in prevention strategies. Although there were fewer associations for the Multiple Races, NH AIAN, and NH NHPI groups, the associations we report here add new evidence for these groups—as well as for the Asian group—which are largely not included in previous research.^{4–12} To help equitably prevent bullying victimization and substance use, cultural tailoring of messaging and interventions may be needed, accounting for cultural differences in perceptions, attitudes, and values about bullying and substance use. Last, in this study, we found that many of the aPRs for the measures including *electronic* bullying victimization and substance use behaviors were often close to or exceeding 2 (Table 3). This strong association, along with frequent media use among youth,²⁷ and low awareness among parents for children’s bullying experiences online,²⁸ may underscore the importance of addressing bullying in the online setting.

Data from the 2021 Middle School YRBS are expected to be released in spring of 2023. Our 2019 results could provide a baseline for which to analyze post-pandemic trends. In addition, the 2021 YRBS data were likely affected by hybrid learning, with issues similar to those reported for the Adolescent Behavior and Experiences Survey (ABES), which used YRBS questions and was also conducted in 2021 (in the spring as opposed to in the fall when YRBS 2021 data were collected).²⁹ The associations between bullying experiences and substance use behaviors among middle or high school students have not yet been assessed using ABES or YRBS 2021 data. A study examining these data could help indicate if associations differed during the pandemic.

Nevertheless, with the public health emergency for the COVID-19 pandemic having ended on May 11, 2023,³⁰ we are entering a new era in public health prevention. Middle school administrators could use our results to plan for bullying and substance use prevention strategies, as schools return to a similar context as 2019 with regard to in-person learning. Also noteworthy in our study was that we found significant associations between bullying victimization and substance use behaviors for all 7 race/ethnicity categories examined. The

COVID-19 pandemic showed a light on health risk behavior disparities among high school aged youth,²⁹ and bullying and substance use research would benefit from a more nuanced examination of how bullying is understood by and affects younger students from diverse racial and ethnic backgrounds, as well as how bullying is related to documented disparities in other forms of violence and substance use.

Limitations

Although the data for our study are made up of representative state level YRBS samples, our pooled data could only include the 13 states that chose to administer the YRBS's bullying victimization questions in 2019. Our pooling data across over a dozen states that reflect different regions of the country helps to strengthen the evidence base on this topic. In addition, the pooled data allowed us to examine more diverse categories for race/ethnicity. Other limitations of our study include the inability to assess causation or the direction of the associations, and potential overlap between the at-school and electronic bullying questions. We also could not examine bullying perpetration, which the Middle School YRBS does not measure; illicit drug use, due to small cell sizes in the dataset; or sexual identity or the current use of multiple substances, which were not as commonly measured across states. Future analyses examining bullying behaviors, polysubstance use, and sexual identity could help inform strategies for youth at a higher risk for adverse outcomes.

CONCLUSION

This study analyzes the relationship between lifetime bullying victimization and substance use behaviors among middle school students, using representative data from 13 states collected during a time immediately preceding the COVID-19 pandemic. The relationship between bullying and substance use among middle school students is a highly relevant issue to consider as students return to classrooms after the pandemic. Implementing culturally tailored prevention strategies for younger adolescents to prevent the related risk behaviors of bullying and substance use may help to potentially interrupt youth's trajectories towards other harmful experiences and outcomes.

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Table 1.

Demographic Characteristics, Bullying Victimization, and Substance Use Behaviors Among US Middle School Students in States Reporting 2019 YRBS data: Overall and by Sex

Characteristic or Experience	All Students (N = 74,059 [†])		Female Students (n = 36,461)		Male Students (n = 37,042)		p
	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)	
Race/ethnicity [‡]							.00*
American Indian/Alaska Native [‡]	1819	1.91 (1.51–2.40)	773	1.73 (1.31–2.28)	1046	2.07 (1.66–2.59)	
Asian [‡]	3478	3.80 (3.21–4.50)	1659	3.59 (2.99–4.32)	1819	4.00 (3.34–4.79)	
Black or African American [‡]	8541	16.84 (14.23–19.83)	4129	16.65 (14.05–19.61)	4412	17.03 (14.26–20.23)	
Hispanic/Latino	11,446	17.20 (15.52–19.02)	5956	17.67 (15.88–19.61)	5490	16.75 (14.96–18.70)	
Native Hawaiian/Other Pacific Islander [‡]	2446	0.96 (0.84–1.10)	1182	0.98 (0.83–1.16)	1264	.94 (.78–1.13)	
White [‡]	36,127	54.50 (50.87–58.09)	17,988	54.16 (50.44–57.85)	18,139	54.83 (51.06–58.54)	
Multiple Races [‡]	4780	4.79 (4.42–5.18)	2633	5.22 (4.72–5.77)	2147	4.38 (3.91–4.90)	
Ever bullied at school [§]							.00*
Yes	30,781	42.11 (41.01–43.22)	17,173	47.22 (45.86–48.58)	13,608	37.28 (35.82–38.77)	
No	42,028	57.89 (56.78–58.99)	18,974	52.78 (51.42–54.14)	23,054	62.72 (61.23–64.18)	
Ever bullied electronically [§]							.00*
Yes	16,333	22.65 (21.67–23.66)	10,381	28.92 (27.57–30.31)	5952	16.72 (15.68–17.82)	
No	56,599	77.35 (76.34–78.33)	25,839	71.08 (69.69–72.43)	30,760	83.28 (82.18–84.32)	
Ever bullied at school and electronically [§]							.00*
Yes	12,349	17.03 (16.13–17.96)	8072	22.26 (21.07–23.50)	4277	12.08 (11.10–13.15)	
No	60,631	82.97 (82.04–83.87)	28,146	77.74 (76.50–78.93)	32,485	87.92 (86.85–88.90)	
Ever tried cigarette smoking							.90
Yes	5072	9.38 (8.67–10.14)	2487	9.35 (8.49–10.28)	2585	9.41 (8.54–10.36)	
No	55,128	90.62 (89.86–91.33)	27,414	90.65 (89.72–91.51)	27,714	90.59 (89.64–91.46)	
Ever tried alcohol [§]							.61
Yes	14,306	21.34 (20.26–22.47)	7114	21.51 (20.28–22.79)	7192	21.19 (19.94–22.49)	
No	53,705	78.66 (77.53–79.74)	26,824	78.49 (77.21–79.72)	26,881	78.81 (77.51–80.06)	.96
Ever tried marijuana [§]							
Yes	6298	8.94 (8.06–9.90)	3174	8.95 (8.01–10.00)	3124	8.92 (7.88–10.10)	
No	64,323	91.06 (90.10–91.94)	32,083	91.05 (90.00–91.99)	32,240	91.08 (89.90–92.12)	
Ever used an EVP							.44
Yes	14,486	22.20 (20.92–23.53)	7425	22.53 (21.02–24.10)	7061	21.88 (20.38–23.47)	
No	52,193	77.80 (76.47–79.08)	25,776	77.47 (75.90–78.98)	26,417	78.12 (76.53–79.62)	
Ever misused prescription pain medicine [#]							.00*
Yes	4533	7.87 (7.37–8.39)	2528	9.05 (8.39–9.76)	2005	6.73 (6.08–7.45)	
No	53,273	92.13 (91.6–92.63)	26,391	90.95 (90.24–91.61)	26,882	93.27 (92.55–93.92)	

CI, confidence interval; EVP, electronic vapor product; YRBS, Youth Risk Behavior Survey.

* $p < .05$, chi-square test.

[†]This column reports prevalence estimates using the overall pooled sample from the 13 states that reported Middle School YRBS bullying victimization data and includes students missing data on sex.

[‡]Non-Hispanic.

[§]Data available from 13 states: Delaware, Hawaii, Kentucky, Maine, Maryland, North Carolina, New Mexico, North Dakota, Pennsylvania, Rhode Island, Vermont, Virginia, and West Virginia.

^{||}Data available from 9 states: Delaware, Hawaii, Kentucky, Maryland, New Mexico, North Dakota, Pennsylvania, Rhode Island, and West Virginia.

[¶]Data available from 12 states: Delaware, Hawaii, Kentucky, Maryland, North Carolina, New Mexico, North Dakota, Pennsylvania, Rhode Island, Vermont, Virginia, and West Virginia.

[#]Data available from 12 states: Delaware, Hawaii, Kentucky, Maine, Maryland, North Carolina, New Mexico, North Dakota, Pennsylvania, Rhode Island, Virginia, and West Virginia.

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Table 2.

Demographic Characteristics, Bullying Victimization, and Substance Use Behaviors Among US Middle School Students in States Reporting 2019 YRBS
Data: By Race/Ethnicity

Experience	American Indian/ Alaska Native [†] (n = 1831)			Asian [‡] (n = 3506)			Black or African American [†] (n = 8574)			Hispanic/Latino (n = 11,537)			Native Hawaiian/ Other Pacific Islander [†] (n = 2459)			White [‡] (n = 36,282)			Multiple Races [‡] (n = 4807)			p	
	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)			
Ever bullied at school [‡]																						00*	
Yes	807	43.63 (39.01– 48.36)	1214	32.91 (29.33– 36.70)	2990	36.85 (34.40– 39.38)	4856	40.76 (38.53– 43.03)	982	41.91 (36.22– 47.82)	15,920	44.06 (42.59– 45.53)	2217	48.96 (45.13– 52.79)									
No	1009	56.37 (51.64– 60.99)	2238	67.09 (63.30– 70.67)	5508	63.15 (60.62– 65.60)	6549	59.24 (56.97– 61.47)	1405	58.09 (52.18– 63.78)	20,186	55.94 (54.47– 57.41)	2550	51.04 (47.21– 54.87)									
Ever bullied electronically [‡]																						00*	
Yes	457	24.98 (20.99– 29.45)	637	19.61 (16.41– 23.26)	1403	17.96 (16.49– 19.53)	2551	21.53 (19.56– 23.63)	550	26.90 (21.60– 32.96)	8784	24.76 (23.49– 26.08)	1212	24.92 (21.95– 28.14)									
No	1361	75.02 (70.55– 79.01)	2821	80.39 (76.74– 83.59)	7091	82.04 (80.47– 83.51)	8873	78.47 (76.37– 80.44)	1847	73.10 (67.04– 78.40)	27,403	75.24 (73.92– 76.51)	3551	75.08 (71.86– 78.05)									
Ever bullied at school and electronically [‡]																						00*	
Yes	347	18.71 (14.98– 23.11)	426	13.47 (10.92– 16.50)	992	12.34 (11.03– 13.78)	1929	15.77 (14.14– 17.56)	404	19.99 (15.57– 25.29)	6767	19.19 (17.98– 20.46)	936	18.39 (15.68– 21.46)									
No	1472	81.29 (76.89– 85.02)	3033	86.53 (83.50– 89.08)	7513	87.66 (86.22– 88.97)	9510	82.44 (84.23– 85.86)	1993	80.01 (74.71– 84.43)	29,420	80.81 (79.54– 82.02)	3830	81.61 (78.54– 84.32)									
Ever tried cigarette smoking [§]																						00*	
Yes	177	15.34 (11.29– 20.51)	134	4.83 (3.19– 7.25)	609	9.91 (8.00– 12.21)	1196	11.15 (9.82– 12.63)	372	16.36 (13.57– 19.59)	2004	8.71 (7.74– 9.80)	401	13.20 (10.62– 16.29)									
No	1120	84.66 (79.49– 88.71)	2995	95.17 (92.75– 96.81)	6441	90.09 (87.79– 92.00)	8665	88.85 (87.37– 90.18)	1869	83.64 (80.41– 86.43)	26,856	91.29 (90.20– 92.26)	3643	86.80 (83.71– 89.38)									

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Experience	American Indian/ Alaska Native [‡] (n = 1831)		Asian [‡] (n = 3506)		Black or African American [‡] (n = 8574)		Hispanic/Latino (n = 11,537)		Native Hawaiian/ Other Pacific Islander [‡] (n = 2459)		White [‡] (n = 36,282)		Multiple Races [‡] (n = 4807)		p
	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)	
Ever tried alcohol [‡]															00*
Yes	411	25.49 (20.98– 30.59)	418	10.68 (8.65– 13.12)	1704	24.33 (21.70– 27.18)	2916	27.84 (25.76– 30.03)	745	27.03 (24.05– 30.22)	6468	18.99 (17.83– 20.20)	1109	23.80– 30.58)	
No	1222	74.51 (69.41– 79.02)	2923	89.32 (86.88– 91.35)	5912	75.67 (72.82– 78.30)	7577	72.16 (69.97– 74.24)	1592	72.97 (69.78– 75.95)	27,743	81.01 (79.80– 82.17)	3358	72.94 (69.42– 76.20)	
Ever triedmarijuana [‡]															00*
Yes	279	16.53 (12.75– 21.17)	114	3.33 (2.31– 4.78)	907	13.40 (11.39– 15.70)	1528	11.98 (10.42– 13.74)	435	14.97 (12.29– 18.13)	2291	6.66 (5.84– 7.57)	563	12.98 (10.28– 16.26)	
No	1471	83.47 (78.83– 87.25)	3310	96.67 (95.22– 97.69)	7024	86.60 (84.30– 88.61)	9413	88.02 (86.26– 89.58)	1926	85.03 (81.87– 87.71)	33,127	93.34 (92.43– 94.16)	4062	87.02 (83.74– 89.72)	
Ever used an EVP [¶]															00*
Yes	445	29.29 (25.05– 33.92)	514	11.51 (9.43– 13.97)	1698	19.97 (16.94– 23.39)	3159	26.96 (24.67– 29.38)	1052	39.24 (34.44– 44.25)	5899	21.47 (20.04– 22.98)	1161	29.09 (25.73– 32.69)	
No	1152	70.71 (66.08– 74.94)	2809	88.49 (86.03– 90.57)	6331	80.03 (76.61– 83.06)	7787	73.04 (70.62– 75.33)	1317	60.76 (55.75– 65.56)	26,049	78.53 (77.02– 79.96)	3317	70.91 (67.31– 74.27)	
Ever misused prescription painmedicine [¶]															00*
Yes	160	9.02 (6.82– 11.84)	203	8.14 (6.13– 10.75)	699	9.45 (7.87– 11.31)	1208	11.06 (9.85– 12.40)	295	12.60 (9.95– 15.83)	1442	6.40 (5.78– 7.07)	345	8.03 (6.33– 10.13)	
No	1377	90.98 (88.16– 93.18)	2920	91.86 (89.25– 93.87)	6995	90.55 (88.69– 92.13)	9242	88.94 (87.60– 90.15)	2023	87.40 (84.17– 90.05)	24,008	93.60 (92.93– 94.22)	3671	91.97 (89.87– 93.67)	

CI, Confidence Interval; EVP, electronic vapor product; YRBS, Youth Risk Behavior Survey.

* P<.05, chi-square test.

[‡] Non-Hispanic.

[¶] Data available from 13 states: Delaware, Hawaii, Kentucky, Maine, Maryland, North Carolina, New Mexico, North Dakota, Pennsylvania, Rhode Island, Vermont, Virginia, and West Virginia.

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§ Data available from 9 states: Delaware, Hawaii, Kentucky, Maryland, New Mexico, North Dakota, Pennsylvania, Rhode Island, and West Virginia.

// Data available from 12 states: Delaware, Hawaii, Kentucky, Maryland, North Carolina, New Mexico, North Dakota, Pennsylvania, Rhode Island, Vermont, Virginia, and West Virginia.

// Data available from 12 states: Delaware, Hawaii, Kentucky, Maine, Maryland, North Carolina, New Mexico, North Dakota, Pennsylvania, Rhode Island, and West Virginia.

Table 3.

aPRs for Bullying Victimization and Substance Use Behaviors Among US Middle School Students in States Reporting 2019 YRBS Data: Overall and by Sex and Race/Ethnicity

Group and Type of Bullying Victimization	Ever Tried Cigarette Smoking [†]		Ever Tried Alcohol [‡]		Ever Tried Marijuana [‡]		Ever Used an EVP [§]		Ever Misused Prescription Pain Medicine [¶]	
	aPR	95% CI	aPR ^{¶¶}	95% CI	aPR ^{¶¶}	95% CI	aPR ^{¶¶}	95% CI	aPR ^{¶¶}	95% CI
All students ^{¶¶}										
Ever bullied at school	1.70*	1.51–1.92	1.41*	1.32–1.51	1.29*	1.14–1.46	1.36*	1.26–1.46	1.73*	1.53–1.95
Ever bullied electronically	2.16*	1.93–2.42	1.91*	1.79–2.05	2.13*	2.90–2.39	1.90*	1.79–2.02	2.19*	1.94–2.48
Ever bullied at school and electronically	2.19*	1.93–2.49	1.91*	1.78–2.06	2.09*	1.85–2.36	1.87*	1.74–2.00	2.32*	2.04–2.63
Female [#]										
Ever bullied at school	2.05*	1.70–2.43	1.61*	1.47–1.76	1.72*	1.47–2.02	1.59*	1.45–1.74	1.93*	1.64–2.28
Ever bullied electronically	2.43*	2.09–2.82	2.13*	1.96–2.31	2.59*	2.23–3.00	2.26*	2.09–2.46	2.56*	2.19–3.00
Ever bullied at school and electronically	2.52*	2.17–2.94	2.12*	1.94–2.30	2.51*	2.14–2.93	2.17*	2.00–2.35	2.63*	2.25–3.08
Male [#]										
Ever bullied at school	1.45*	1.21–1.73	1.25*	1.12–1.39	0.98	0.82–1.17	1.15*	1.04–1.28	1.50*	1.21–1.87
Ever bullied electronically	1.90*	1.52–2.36	1.69*	1.50–1.90	1.71*	1.44–2.04	1.53*	1.37–1.71	1.70*	1.38–2.09
Ever bullied at school and electronically	1.83*	1.43–2.33	1.67*	1.46–1.90	1.62*	1.36–1.95	1.50*	1.32–1.71	1.82*	1.45–2.28
American Indian/Alaska Native ^{**††}										
Ever bullied at school	1.64	0.95–2.84	1.61*	1.11–2.34	1.04	0.66–1.64	1.39	0.95–2.03	1.48	0.80–2.76
Ever bullied electronically	1.86*	1.04–3.35	2.23*	1.56–3.19	1.51*	0.92–2.48	1.97*	1.50–2.58	1.67	0.89–3.15
Ever bullied at school and electronically	2.11*	1.27–3.50	2.58*	1.86–3.58	1.64*	0.95–2.84	2.10*	1.58–2.78	1.94	1.01–3.70
Asian ^{**††}										
Ever bullied at school	2.37*	1.29–4.34	1.96*	1.28–3.00	2.24*	1.04–4.83	2.01*	1.42–2.84	1.28	0.74–2.20
Ever bullied electronically	3.25*	1.67–6.33	3.81*	2.68–5.40	3.94*	1.78–8.72	2.77*	2.05–3.73	2.05*	1.18–3.54
Ever bullied at school and electronically	3.84*	1.91–7.72	3.32*	2.14–5.14	4.97*	2.33–10.59	2.92*	2.05–4.14	1.75*	0.81–3.77
Black or African American ^{**††}										
Ever bullied at school	1.70*	1.20–2.40	1.24*	1.08–1.43	0.93	0.73–1.17	1.24*	1.02–1.51	1.43*	1.11–1.83
Ever bullied electronically	1.79*	1.26–2.53	1.69*	1.44–1.98	1.38*	1.01–1.87	1.56*	1.35–1.80	1.69*	1.19–2.40

Group and Type of Bullying Victimization	Ever Tried Cigarette Smoking [†]		Ever Tried Alcohol [‡]		Ever Tried Marijuana [‡]		Ever Used an EVP [§]		Ever Misused Prescription Pain Medicine [¶]	
	aPR	95% CI	aPR [¶]	95% CI	aPR [¶]	95% CI	aPR [¶]	95% CI	aPR [¶]	95% CI
Ever bullied at school and electronically	1.67*	1.06–2.63	1.71*	1.43–2.04	1.44*	1.05–1.97	1.68*	1.43–1.97	2.00*	1.38–2.89
Hispanic/Latino ^{††}										
Ever bullied at school	1.36*	1.10–1.69	1.31*	1.13–1.52	1.28*	1.06–1.55	1.16	1.00–1.36	1.54*	1.21–1.96
Ever bullied electronically	1.71*	1.37–2.13	1.75*	1.52–2.01	2.25*	1.85–2.74	1.71*	1.52–1.93	2.19*	1.80–2.65
Ever bullied at school and electronically	1.69*	1.30–2.19	1.77*	1.50–2.09	2.08*	1.68–2.57	1.63*	1.44–1.86	2.28*	1.86–2.81
Native Hawaiian/other Pacific Islander ^{**††}										
Ever bullied at school	1.37	0.89–2.11	1.31	0.95–1.79	1.41*	0.98–2.04	1.14	0.89–1.45	1.74*	1.14–2.67
Ever bullied electronically	1.15	0.72–1.85	1.39	0.95–2.05	1.36*	0.85–2.17	1.31	1.00–1.72	2.17*	1.31–3.62
Ever bullied at school and electronically	1.29	0.77–2.17	1.44	0.96–2.16	1.51*	1.00–2.28	1.23	0.89–1.69	2.10*	1.18–3.76
White ^{**††}										
Ever bullied at school	1.89*	1.57–2.28	1.49*	1.35–1.65	1.57*	1.29–1.90	1.50*	1.36–1.65	2.12*	1.73–2.60
Ever bullied electronically	2.51*	2.16–2.93	2.11*	1.91–2.34	2.68*	2.25–3.19	2.10*	1.92–2.30	2.62*	2.20–3.12
Ever bullied at school and electronically	2.55*	2.13–3.04	2.06*	1.85–2.30	2.50*	2.09–2.98	2.02*	1.82–2.23	2.68*	2.21–3.24
Multiple races ^{**††}										
Ever bullied at school	1.48	0.97–2.25	1.55*	1.23–1.95	1.24	0.89–1.72	1.11	0.90–1.37	1.49	0.95–2.35
Ever bullied electronically	2.00*	1.32–3.03	1.34*	1.07–1.68	1.92*	1.38–2.67	1.64*	1.31–2.04	1.33	0.80–2.21
Ever bullied at school and electronically	2.05*	1.33–3.15	1.44*	1.10–1.88	1.92*	1.38–2.67	1.60*	1.28–2.00	1.46	0.87–2.47

aPR, adjusted prevalence ratio; CI, confidence interval; EVP, electronic vapor product; YRBS, Youth Risk Behavior Survey.

* $p < .05$.

[†]Based on pooled analysis of data from 9 states: Delaware, Hawaii, Kentucky, Maryland, New Mexico, North Dakota, Pennsylvania, Rhode Island, and West Virginia.

[‡]Based on pooled analysis of data from 13 states: Delaware, Hawaii, Kentucky, Maine, Maryland, North Carolina, New Mexico, North Dakota, Pennsylvania, Rhode Island, Vermont, Virginia, and West Virginia.

[§]Based on pooled analysis of data from 12 states: Delaware, Hawaii, Kentucky, Maryland, North Carolina, New Mexico, North Dakota, Pennsylvania, Rhode Island, Vermont, Virginia, and West Virginia.

[¶]Based on pooled analysis of data from 12 states: Delaware, Hawaii, Kentucky, Maine, Maryland, North Carolina, New Mexico, North Dakota, Pennsylvania, Rhode Island, Virginia, and West Virginia.

[¶]Models adjusted for age group, sex, and race/ethnicity.

[#]Models adjusted for age group and race/ethnicity.

** Non-Hispanic.

†† Models adjusted for age group and sex.

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