

The Relationship between Bullying, Sexual Violence and Substance Use among Adolescents in the United States: Cross-sectional Study

Chimamanda Okafor¹, Shayesteh Jahanfar^{2*}, Joseph Inungu³, Mark Minelli⁴

¹MPH candidate, Department of public health, School of Health Sciences, Central Michigan University, USA

²PhD, Assistant Professor, School of Health Sciences Building 2239, Central Michigan University, Mount Pleasant, MI 48859, USA

³DrPH, Professor, School of Health Sciences Building 2209, Central Michigan University, Mount Pleasant, MI 48859, USA

⁴PhD, Professor, School of Health Sciences Building 2235, Central Michigan University, Mount Pleasant, MI 48859, USA

*Corresponding Author: jahan2s@cmich.edu

Citation: Okafor, C., Jahanfar, S., Inungu, J., & Minelli, M. (2020). The Relationship between Bullying, Sexual Violence and Substance Use among Adolescents in the United States: Cross-sectional Study. *European Journal of Environment and Public Health*, 4(2), em0049. <https://doi.org/10.29333/ejeph/8329>

ARTICLE INFO

Received: 29 Jan. 2020

Accepted: 31 Mar. 2020

ABSTRACT

Purpose: This study explored the relationship between bullying, sexual violence and substance use among adolescents.

Methods: A cross-sectional study of 14,765 adolescents using the 2017 Youth Risk Behavior Surveillance System (YRBSS) survey was conducted. Multivariate logistic regression analyses were performed, with substance use as the outcome and bullying and sexual violence as explanatory variables in separate models.

Results: The odds of substance in bisexual adolescence was twice as heterosexuals [AOR: 2.00; 95%CI: 1.26-3.22]. Adolescents who experienced electronic bullying had 67% higher odds of substance use than those who did not experience electronic bullying [AOR: 1.67; 95%CI: 1.09-2.55]. Also, adolescents who had experienced sexual violence were had higher odds of reporting substance use than those who had not experienced sexual violence [AOR: 1.68; 95%CI: 1.15-2.45]. Additionally, those who had experienced either school bullying or electronic bullying reported higher rates of sexual violence than those who had not experienced any bullying.

Conclusion: We found a strong association between bullying, sexual violence, and substance use. A multifaceted approach is needed to resolve these problems effectively.

Keywords: adolescent, bullying, school bullying, cyber bullying, substance use, sexual violence

INTRODUCTION

According to Health and Human Services, adolescents in the United States are classified as those aged 10-19 years, of which they make up 13% of the population (Health and Human Services, 2016). Adolescents are exposed to several risk factors such as bullying, sexual violence, and substance use that can harm their health. Bullying can be defined as aggressive or unwanted behavior that deals with power imbalance and is repeated over time (Gaete et al., 2017). This can be done in different forms, such as physical, verbal, social or cyberbullying/electronic bullying (StopBullying.gov, 2018). One out of three students are bullied at school, and 160,000 children skip school daily for fear of being bullied (American Society for the Positive Care of Children, 2020). During the technology and social media era, cyberbullying has become a significant issue among adolescents. In 2015, about 21% of

students aged 12-18 years experienced cyberbullying (StopBullying.gov, 2018).

The Center for Disease Control (2018) defines sexual violence as any sexual act that is committed against someone without any consent given freely and consciously. This includes and is not limited to kissing, touching, or forced sexual intercourse (Centers for Disease Control and Prevention, 2018). According to the National Institute of Drug Abuse, the misuse of drugs/substances is more likely to begin during adolescence (Ertl et al., 2019). These substances include alcohol, tobacco, prescription pills, and illegal drugs like heroin and cocaine (National Institute on Drug Abuse, 2014). Bullying, sexual violence, and substance use are significant public health concerns among U.S. adolescents.

Literature suggests that 11.8% of 7th to 12th graders reported electronic bullying (Brener et al., 2013). Cyberbullying differs from other forms of bullying, which warrants specific research on electronic bullying and its

correlates. Literature investigating all three concepts of bullying, sexual violence and substance use simultaneously is scarce. Van Ouytsel et al. (2017) reports cyber dating abuse perpetration in a small sample of 705 ethnically diverse adolescents in Southeast Texas. Substance use is reported as one of the adverse outcomes, but there is no note of actual bullying or especially sexual violence and their association with substance use.

Substance use is also reported in a review in relation to adolescent dating and sexual violence. (Miller, Jones, & McCauley, 2018) This review does not reveal the association between different types of bullying and substance use. Moreover, a meta-analysis reported some aspects of health and psychosocial problems (mental health outcomes, substance use, and general health outcomes) associated with bullying victimization but failed to analyze the effect of cyberbullying on substance use. (Moore et al., 2017). The lack of research in this area motivated our study. Moreover, a large dataset uniquely accumulating data on adolescence can provide a less heterogeneous picture of the target study group. We aimed at investigating the association between bullying (both school bullying and electronic bullying) on sexual violence and substance use, employing a population-based dataset in the United States focusing on adolescence.

METHODS

The Youth Risk Behavior Surveillance System (YRBSS)

This study used the 2017 Youth Risk Behavior Surveillance System publicly accessible data (2017 YRBSS data). YRBSS is a national survey conducted by the CDC on students in the 9th through 12th grade in public and private schools in the United States. These surveys are held every two years during the spring semester. It uses a three-stage cluster sample design to produce a representative sample of the 9th through 12th-grade students. The three stages of the sample design were as follows: the first stage involved Primary Sampling Units (PSU) consisting of large-sized counties or groups of smaller, adjacent counties. In the second stage, schools were selected from the PSUs and in the last step, they randomly selected one or two entire classes in each chosen school and each of the grades 9-12. All regular public, Catholic, and other private school students in the 50 states and District of Columbia were included in the sampling frame. Students completed the self-administered questionnaire during one class period and recorded their responses directly in a computer-scan able booklet (Brener et al., 2013).

Demographic Variables

The demographic variables used in the study were age (13-18 years), gender (male or female), sexual identity (heterosexual, gay or lesbian, and bisexual), grade (9th to 12th grade), and race/ethnicity (Black or African American, Native Hawaiian or another Pacific Islander, White, Hispanic/Latino, multiple Hispanic/Latino, and multiple non-Hispanic/Latino).

Dependent Variables

The dependent variable for this study was substance use. This variable was determined in the 2017 YRBSS survey by the

participants' answers to the questions on if they have ever used the following substances: marijuana, alcohol, cigarettes, cocaine, ecstasy, inhalants, heroin, methamphetamines, and synthetic marijuana. These variables were summed up and recorded to create a composite variable "substance use." Each participant who used one or more of the substances noted above was scored one. If a participant did not use any substance, they were coded as zero.

Independent Variables

Sexual violence and bullying were considered as the independent variables. Two variables were used for sexual violence: "Have you ever been physically forced to have sexual intercourse when you did not want to?" and "How many times did anyone force you to do sexual things that you did not want to?" The latter question was classified into two groups: the "no" group for participants who answered zero time and the "yes" group for those who said one time or more. The sexual violence variable was obtained from summing up "Have you ever been physically forced to have sexual intercourse when you did not want to?" and the recoded "Did anyone force you to do sexual things that you did not want to?" variables. This sum was further recoded to create a composite variable "sexual violence." The two types of bullying: school bullying and electronic bullying were used for the analysis. The variables used for bullying were "have you ever been bullied on school property?" and "have you ever been electronically bullied (texting, Instagram, Facebook, or other social media)?"

Study Size

The analytical sample size was 14,765 questionnaires taken from the YRBSS survey 2017 data file. 144 of the 192 sampled schools participated in the survey, and 14,956 of the 18,324 sampled students submitted questionnaires. After data editing, only 14,765 questionnaires were usable. According to YRBSS 2017 report, the overall response rate for the study was 60%.

Statistical Methods

Descriptive analysis was used to provide an overview of the basic characteristics of the study data. Bivariate analysis, such as chi-square, was used to examine the relationships between different variables and test for any significant difference ($\alpha=5\%$). The data were analyzed using SPSS version 25.0. Univariate and multivariate logistic regression analyses were performed, with substance use as the outcome and bullying and sexual violence as explanatory variables in separate models. Odds Ratio (OR) and 95% Confidence interval (95%CI) was reported for unadjusted and adjusted models.

Ethical Considerations

YRBSS ensured that parents of the students provided their consent to allow participation in the survey. National YRBSS follows local parental procedures, which are both active and passive, depending on the jurisdiction. To ensure and protect student's privacy, the participation was anonymous and voluntary.

Table 1. Sociodemographic characteristics of the adolescents (N=14,765) from Youth Risk Behavior Surveillance System 2017 database

Variables	Frequency N (%)
Gender*	
Male	7112 (48.6)
Female	7526 (51.4)
Age	
13 years or younger	81 (0.6)
14 years	1922 (13.1)
15 years	3586 (24.4)
16 years	3688 (25.1)
17 years	3611 (24.6)
18 years or older	1786 (12.2)
Race/Ethnicity	
Black or African American	50 (4.5)
Native Hawaiian or other Pacific Islander	31 (2.8)
White	120 (10.9)
Hispanic/Latino	458 (41.5)
Multiple-Hispanic/Latino	405 (36.7)
Multiple-Non-Hispanic/Latino	40 (3.6)
Sexual Identity	
Heterosexual (Straight)	12012 (88.9)
Gay or Lesbian	357 (2.6)
Bisexual	1137 (8.4)
Grade	
9 th	3921 (26.8)
10 th	3715 (25.4)
11 th	3602 (24.6)
12 th	3383 (23.1)
Sexual Violence	
<i>Physically forced to have sexual intercourse</i>	
No	13336 (92.4)
Yes	1104 (7.6)
<i>Forced to do sexual things that they did not want to</i>	
No	12724 (90.0)
Yes	1421 (10.0)
Bullying	
<i>School bullying</i>	
No	11941 (81.8)
Yes	2665 (18.2)
<i>Electronic bullying</i>	
No	12482 (85.5)
Yes	2113 (14.5)
Substance Use	
Alcohol	
No	13184 (91.5)
Yes	1223 (8.5)
Cigarettes	
No	9224 (71.0)
Yes	3760 (29.0)
Cocaine	
No	13789 (95.0)
Yes	719 (5.0)
Inhalants	
No	11197 (93.7)
Yes	750 (6.3)
Heroin	
No	14087 (98.0)
Yes	293 (2.0)
Methamphetamine	
No	13994 (97.3)
Yes	384 (2.7)
Ecstasy	
No	13761 (95.9)
Yes	590 (4.1)
Synthetic Marijuana	
No	13386 (93.2)
Yes	975 (6.8)
Marijuana	
No	11520 (80.1)
Yes	2866 (19.9)

*127 missing data

Table 2. Comparing two groups with or without substance use

Variables	Did not Use Substances N (%)	Used Substances N (%)	P-value
Gender			
Male	4522 (63.7)	2580 (36.3)	0.001
Female	4523 (60.1)	3001 (39.9)	
Age			
13 years or younger	24 (30.4)	55 (69.6)	0.001
14 years	1458 (75.9)	463 (24.1)	
15 years	2457 (68.6)	1126 (31.4)	
16 years	2254 (61.2)	1431 (38.8)	
17 years	1975 (54.7)	1634 (45.3)	
18 years or older	891 (49.6)	905 (50.4)	
Race/Ethnicity			
Black or African American	35 (70.0)	15 (30.0)	0.044
Native Hawaiian or other Pacific Islander	20 (64.5)	11 (35.5)	
White	83 (69.2)	37 (30.8)	
Hispanic/Latino	260 (57.0)	196 (43.0)	
Multiple-Hispanic/Latino	227 (56.0)	178 (44.0)	
Multiple-Non-Hispanic/Latino	20 (50.0)	20 (50.0)	
Sexual Identity			
Heterosexual (Straight)	7575 (63.1)	4435 (36.9)	0.001
Gay or Lesbian	152 (42.7)	204 (57.3)	
Bisexual	535 (47.1)	602 (52.9)	
Grade			
9 th	2851 (72.8)	1063 (27.2)	0.001
10 th	2384 (64.2)	1328 (35.8)	
11 th	2088 (58.0)	1513 (42.0)	
12 th	1715 (50.7)	1667 (49.3)	
Sexual Violence			
<i>Physically forced to have sexual intercourse</i>			
No	8533 (64.0)	4793 (36.0)	0.001
Yes	383 (34.8)	719 (65.2)	
<i>Forced to do sexual things that they did not want to</i>			
No	8282 (65.1)	4433 (34.9)	0.001
Yes	524 (37.0)	894 (63.0)	
Bullying			
<i>School bullying</i>			
No	7615 (63.8)	4317 (36.2)	0.001
Yes	1409 (52.9)	1254 (47.1)	
<i>Electronic bullying</i>			
No	8030 (64.4)	4443 (35.6)	0.001
Yes	993 (47.0)	1118 (53.0)	

RESULTS

Sociodemographic Characteristics

Table 1 describes the sociodemographic characteristics of adolescents (N=14,765) in the YRBSS survey. In this study, there were 7,112 males. About race/ethnicity, majority of adolescents (41.5%) identified themselves as Hispanic/Latino. Majority of the population had 16 years of age (25.1%), were heterosexual (88.9%), and were in grade 10th (25.4%). School bullying was experienced by 18.2% of all adolescents, and 14.5% of all adolescents reported experiencing electronic bullying. In terms of substance use, cigarette use had the highest percentage, with 29% of adolescents reporting using cigarettes. Marijuana was the second most frequently used drug, with 19.9% of adolescents reporting using marijuana.

Substance Use

A bivariate analysis was conducted to determine the relationship between the descriptive variables, sexual violence, and bullying among adolescents' substance use status (See **Table 2**). These substances include alcohol,

Table 3. Unadjusted and Adjusted ORs (and 95% CI) for factors associated with substance use among adolescents

Variables	Unadjusted Odds Ratio (95% CI)	Adjusted Odds Ratio (95% CI)
Gender		
Male	1.00	1.00
Female	1.16 (1.09-1.24)	1.14 (0.85-1.53)
Age		
13 years or younger	2.26 (1.39-3.68)	0.61 (0.14-2.75)
14 years	0.31 (0.27-0.36)	0.37 (0.14-0.94)
15 years	0.45 (0.40-0.51)	0.75 (0.33-1.72)
16 years	0.63 (0.56-0.70)	0.64 (0.31-1.31)
17 years	0.82 (0.73-0.91)	0.80 (0.46-1.39)
18 years or older	1.00	1.00
Race/Ethnicity		
Black or African American	0.55 (0.29-1.03)	0.51 (0.24-1.09)
Native Hawaiian or other Pacific Islander	0.70 (0.33-1.50)	0.48 (0.20-1.20)
White	0.57 (0.37-0.88)	0.60 (0.37-0.96)
Hispanic/Latino	0.96 (0.73-1.26)	1.15 (0.84-1.56)
Multiple-Non-Hispanic/Latino	1.28 (0.67-2.44)	1.70 (0.82-3.54)
Multiple-Hispanic/Latino	1.00	1.00
Sexual Identity		
Heterosexual (Straight)	1.00	1.00
Gay or Lesbian	2.29 (1.85-2.84)	1.96 (0.90-4.30)
Bisexual	1.92 (1.70-2.17)	2.02 (1.26-3.23)
Grade		
9 th	1.00	1.00
10 th	1.49 (1.36-1.65)	0.94 (0.60-1.50)
11 th	1.94 (1.76-2.14)	1.40 (0.76-2.59)
12 th	2.61 (2.37-2.87)	1.30 (0.59-2.86)
Sexual Violence		
Did not experience sexual violence (No)	1.00	1.00
Experienced sexual violence (Yes)	2.99 (2.71-3.30)	1.68 (1.15-2.45)
Bullying		
School bullying		
No	1.00	1.00
Yes	1.57 (1.44-1.71)	1.03 (0.71-1.51)
Electronic bullying		
No	1.00	1.00
Yes	2.04 (1.85-2.23)	1.66 (1.09-2.54)

Significant Odd Ratios (OR) are shown in bold (p<0.05)

cigarettes, marijuana, cocaine, ecstasy, inhalants, heroin, methamphetamines, and synthetic marijuana. Females had a higher percentage of substance use than males (39.9% vs 36.3%, p=0.001). Adolescents aged 13 years or younger reported a higher prevalence of substance use (69.6%, p=0.001) than the other age groups. Also, adolescents who identified as bisexual (52.9%) or gay (57.3%) had a higher prevalence of substance use than heterosexuals (36.9%).

Results of the univariate logistic regression (see **Table 3**) showed that females were 1.16 times more prone to report using substances than males [OR: 1.16; 95%CI: 1.09-1.24]. Adolescents aged 13 years or younger were 2.26 times more likely to report using substances than those aged 18 years or older [OR: 2.26; 95%CI: 1.39-3.68]. Also, Whites were less likely to report using substances when compared to those who identified as multiple Hispanic/Latino [OR: 0.57; 95%CI: 0.37-0.88]. In terms of sexual identity, the odds of substance use was two times higher in adolescents who identified as either gay or bisexual compared to heterosexuals [OR: 2.29; 95%CI: 1.85-2.84 vs OR: 1.92; 95%CI: 1.70-2.17, respectively].

Multivariate logistic regression was performed to ascertain the effects of age, gender, race/ethnicity, sexual identity,

Table 4. Relationship between sexual violence and bullying

Variables	Did not Experience Sexual Violence N (%)	Experienced Sexual Violence N (%)	P-value
Bullying			
School bullying			
No	10584 (89.8)	1205 (10.2)	0.001
Yes	1899 (72.4)	725 (27.6)	
Electronic bullying			
No	11068 (89.8)	1251 (10.2)	0.001
Yes	1410 (67.7)	672 (32.3)	

Statistically Significant (P<0.05)

grade, sexual violence, and bullying on substance use among adolescents (**Table 3**). Results showed that only odds of substance use was higher among those who identified as bisexual compared to heterosexuals [AOR: 2.00; 95%CI: 1.26-3.22]. Adolescents aged 14 years were less prone to use substances than those aged 18 years or older. In relation to race/ethnicity, Whites were less likely to use substances than those who identify as multiple Hispanic/Latino. The other age groups, gender, and race/ethnicity were not found to be significant.

Bullying and Substance Use

Adolescents who were bullied reported using substances. Those who experienced school bullying had a higher prevalence (47.1%) of substance use than those who did not experience school bullying, whilst those who were bullied electronically had a prevalence of 53% when reporting substance use (**Table 2**).

Unadjusted odds ratio revealed that (**Table 3**), the odds of substance use was higher among those who experienced school bullying than those who did not experience school bullying [OR: 1.57; 95%CI: 1.44-1.71]. Furthermore, the odds of substance use was twice as much in adolescents who experienced electronic bullying compared to the reference category [OR: 2.04; 95%CI: 1.85-2.23, respectively]. After adjusting for gender, age, race/ethnicity, sexual identity, and grade, those the odds of substance use was 1.66 times higher in adolescents who experienced electronic bullying compared to those who did not experience electronic bullying [AOR: 1.66; 95%CI: 1.09-2.54]. School bullying was not found to be significant or associated with substance use in the multivariate regression.

Sexual Violence and Substance Use

For the bivariate analysis (**Table 2**), those who experienced sexual violence or forced sexual intercourse reported a higher prevalence of substance use. About 63% of adolescents who were forced to do sexual things reported using substances, whilst 65.2% of those who had experienced forced sexual intercourse reported using substances.

Multivariate regression analysis (**Table 3**) showed that the odds of substance use among adolescents who had experienced sexual violence were 1.68 times more than those who had not experienced sexual violence [AOR: 1.68; 95%CI: 1.15-2.45].

Bullying and Sexual Violence

To determine the relationship between bullying and sexual violence, a bivariate analysis was performed (see **Table 4**).

Those who had experienced either school bullying or electronic bullying reported higher rates of sexual violence than those who had not experienced any bullying. About 27.6% of adolescents who had been bullied in the school reported experiencing sexual violence, whilst 32.3% of adolescents who had experienced electronic bullying reported experiencing sexual violence.

DISCUSSION

The purpose of this study was to determine the relationship between bullying, sexual violence and substance use among adolescents. We hypothesized that adolescents who are victims of bullying (school bullying and electronic bullying) are more prone to be victims of sexual violence. Also, adolescents who have been bullied and/or sexually violated are more prone to use substances. The relationships between these variables are discussed below.

In this study, school bullying was experienced by 18.2% of all adolescents, and 14.5% of all adolescents reported experiencing electronic bullying. In addition, 7.6% of adolescents reported being physically forced to have sexual intercourse (**Table 1**). These statistics are slightly higher than the 2015 YRBSS data, which showed that 6.7% of all adolescents were forced to have sexual intercourse, 15.5% of adolescents were bullied electronically, and 20.2% were bullied in school (Centers for Disease Control and Prevention, 2016). This shows that bullying and sexual violence are still significant issues facing adolescents in the U.S.

Bullying and Substance Use

In our study, we looked at two types of bullying: school bullying and electronic bullying. We found that adolescents who experienced electronic bullying were twice as prone to use substances as those who did not experience electronic bullying (**Table 3**). Previous research found that victims of bullying were more likely to use substances than those who were not bullied (Gaete et al., 2017; Tharp-Taylor, Haviland, & D'Amico, 2009). Using a cross-sectional investigation of bullying experience and substance use amongst adolescents in Chile, Gaete et al. (2017) found that victims of bullying were 1.14 times more likely to use cigarettes and 1.23 times more likely to use alcohol than those who did not experience any bullying [AOR: 1.14; 95%CI: 1.00-1.29 vs AOR:1.23; 95%CI: 1.10-1.38].

Furthermore, Litwiller and Brausch (2013) found significant associations with both types of bullying (physical bullying and cyberbullying) and substance use, though, cyberbullying accounted for slightly more variance on substance use than physical bullying (5.42 vs 4.60, $p=0.001$) (Litwiller & Brausch, 2013). However, our study did not find an association between school bullying and substance use. This was probably due to the different variables used for school bullying in our study.

Sexual Violence and Substance Use

Regarding sexual violence and substance use, we found that the odds of substance use among adolescents who had experienced sexual violence were 68% higher compared to

those who had not experienced sexual violence (**Table 3**). In line with our study, Brady, Tschann, Pasch, Flores and Ozer (2008) found that adolescents who had experienced sexual violence at age 15 were more likely to use tobacco at age 19, and those who had multiple sexual partners were more likely to use marijuana at age 19 (Brady et al., 2008). Additionally, studying the association between non-medical use of the prescription drug (NMUPD) and sexual violence among adolescents, Clayton et al. (2017) reported that male victims of sexual violence were 1.61 times more likely to use NMUPD than those who did not experience sexual violence [AOR: 1.61; 95%CI: 1.21-2.12]. However, the association was not significant among female victims of sexual violence (Clayton, Lowry, Basile, Demissie, & Bohm, 2017).

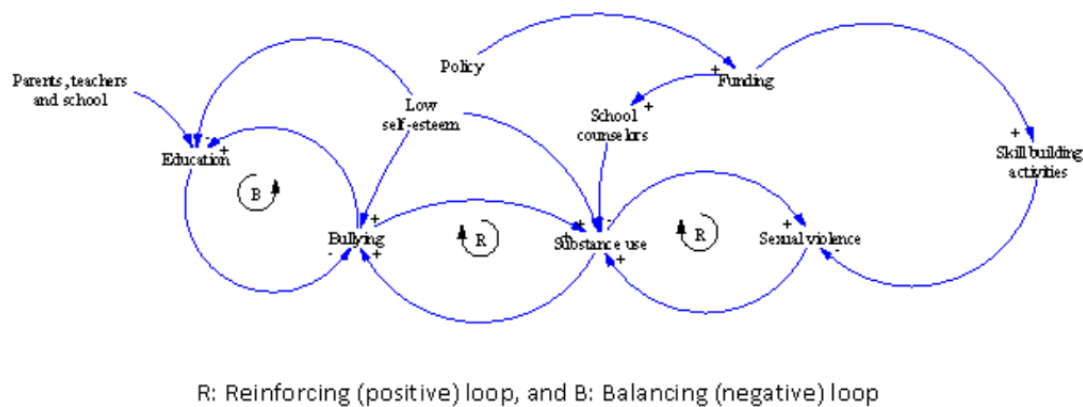
Bullying and Sexual Violence

Our study found that adolescents who had experienced either school bullying or electronic bullying reported higher rates of sexual violence than those who had not experienced any bullying (**Table 4**). There is limited research investigating the relationship between victims of bullying and subsequent sexual violence among adolescents. Results from a cross-sectional study by Clear et al. (2014) support our findings that victims of bullying reported being victims of sexual harassment. Their result showed that out of the 11.3% of the adolescents who had been bullied more than twice, 57.2% were victims of sexual harassment ($p=0.0001$) (Clear et al., 2014). The result is slightly higher than our study, which found that out of the 18.2% who had experienced school bullying, 27.6% reported experiencing sexual violence ($P=0.001$) (**Tables 1 & 4**).

Public Health Implications/Recommendations

With the associations found with electronic bullying, sexual violence and substance use in our study, it is important for public health officials to use a multifaceted approach such as systems thinking to reveal its complex picture. Systems thinking is an innovative way of simplifying the issue of bullying, sexual violence, and substance use as it helps to understand assumptions and take the big picture into account. One of the tools of systems thinking that can be used is the causal loop diagram (de Pinho, 2015). Causal loop diagrams can help reveal the interrelationships between factors like education, and health system on bullying, sexual violence, and substance use. It can also demonstrate the positive and negative effects of the strategies identified. The resulting causal loop diagram (see **Figure 1**) will help public health officials or policymakers to make better decisions on the best strategies to reduce the effects of bullying and sexual violence on substance use.

Cyberbullying/electronic bullying has been linked to emotional distress, depression, anxiety, and suicidality (Goebert et al., 2011). Parents, teachers, and students should be educated on the two types of bullying and their impacts on sexual violence and substance use. Some websites, like cyberbullyhelp.com have created curricula, handouts, and presentations to eliminate cyberbullying. Schools can use these curricula, handouts, and presentations to educate their students. In addition, schools should have clear rules against bullying, and reduce the benefits of bullying. A systematic



R: Reinforcing (positive) loop, and B: Balancing (negative) loop

Figure 1. Causal loop diagram

review found that interventions that were focused on the whole school were more effective than other interventions that just delivered intervention through classroom curricula (Carta et al., 2015).

For sexual violence, the school can create awareness about it and provide skill-building classes to help them avoid the incident. They can educate the students and parents on the steps to recognize violent and abusive behaviors (De La Rue, Polanin, Espelage, & Pigott, 2014). Additionally, counsellors and support groups can be provided in schools for those who are facing the trauma of sexual violence. This will help and prevent them from resorting to substance use to resolve the issues at hand.

Future research can analyze how the systems thinking approach can be applied to bullying, sexual violence and substance use. Using previous research on the factors associated with bullying, sexual violence, and substance use, the researchers can draw up a causal loop diagram to demonstrate the positive and negative feedback loop of these issues and the strategies that can help to address them.

Strength and Limitations of the Study

The major strength of this study was the use of the large YRBSS dataset that allowed for the incorporation of a considerable number of variables. For instance, the substance use variable accounted for nine different types of substances such as marijuana, alcohol, cigarettes, cocaine, ecstasy, inhalants, heroin, methamphetamines, and synthetic marijuana use. The first limitation is that the cross-sectional survey design is prone to reporting bias and recall bias as it relied on respondents' reports of substance use. Recall bias might vary due to the type of question asked. For example, ever been forced to have sexual intercourse is a lifetime recall, while substances like alcohol and cigarettes are 30 days or lifetime recall. Moreover, response rate of 60% is relatively good for surveys of this nature as adolescence participation in research tends to be low.

In addition, the extent of underreporting or over-reporting of behaviours cannot be determined. Secondly, the study design does not allow us to determine causality, and it can only show relationships between variables. Lastly, the study cannot be generalized to all persons in the age group as the YRBSS survey data apply only to youths who attend school.

CONCLUSION

Bullying, sexual violence, and substance use are significant public health concerns among U.S. adolescents. This study was able to explore the relationship between bullying, sexual violence, and substance use among adolescents. With the strong association between bullying, sexual violence, and substance use, a multifaceted approach is needed to deal with these problems effectively.

ABBREVIATIONS

CDC	: Center for Disease Control
CI	: Confidence Interval
HHS	: Health and Human Services
NIDA	: National Institute of Drug Abuse
OR	: Odds Ratio
PSU	: Primary Sampling Unit
YRBSS	: Youth Risk Behavior Surveillance System

REFERENCES

- American Society for the Positive Care of Children. (2020). *Bullying Statistics and Information*. Available at: <https://americanspcc.org/> (Accessed 28 March 2020).
- Brady, S. S., Tschann, J. M., Pasch, L. A., Flores, E., & Ozer, E. J. (2008). Violence Involvement, Substance Use, and Sexual Activity Among Mexican-American and European-American Adolescents. *Journal of Adolescent Health*. <https://doi.org/10.1016/j.jadohealth.2008.02.007>
- Brener, N. D., Kann, L., Shanklin, S., Kinchen, S., Eaton, D. K., Hawkins, J., & Flint, K. H. (2013). Methodology of the Youth Risk Behavior Surveillance System--2013. *MMWR. Recommendations and Reports: Morbidity and Mortality Weekly Report. Recommendations and Reports*, 62(RR-1), 1-20.
- Carta, E. C., Piras, A. P., Vellante, M., Preti, A., Daniélsdóttir, S., D'Aloja, E., ... Bhugra, D. (2015). Interventions on Bullying and Cyberbullying in Schools: A Systematic Review. *Clinical Practice & Epidemiology in Mental Health*. <https://doi.org/10.2174/1745017901511010058>

- Centers for Disease Control and Prevention. (2016). 2015 YRBS Data User's Guide. <https://doi.org/10.1016/j.jadohealth.2016.03.017>
- Centers for Disease Control and Prevention. (2018). Sexual Violence Definition. Available at: <https://www.cdc.gov/violenceprevention/sexualviolence/fastfact.html> (Accessed 28 March 2020).
- Clayton, H. B., Lowry, R., Basile, K. C., Demissie, Z., & Bohm, M. K. (2017). Physical and Sexual Dating Violence and Nonmedical Use of Prescription Drugs. *Pediatrics*. <https://doi.org/10.1542/peds.2017-2289>
- Clear, E. R., Coker, A. L., Cook-Craig, P. G., Bush, H. M., Garcia, L. S., Williams, C. M., ... Fisher, B. S. (2014). Sexual Harassment Victimization and Perpetration Among High School Students. *Violence Against Women*. <https://doi.org/10.1177/1077801214551287>
- De La Rue, L., Polanin, J. R., Espelage, D. L., & Pigott, T. D. (2014). School-Based Interventions to Reduce Dating and Sexual Violence: A Systematic Review. *Campbell Systematic Reviews* 2014:7. *Campbell Systematic Review*. <https://doi.org/10.4073/csr.2014.7>
- de Pinho, H. (2015). Participant guidelines: Systems Tools for complex health systems: a guide to creating causal loop diagrams.
- Ertl, A., Sheats, K. J., Petrosky, E., Betz, C. J., Yuan, K., & Fowler, K. A. (2019). Surveillance for Violent Deaths - National Violent Death Reporting System, 32 States, 2016. *Morbidity and Mortality Weekly Report. Surveillance Summaries (Washington, D.C.: 2002)*, 68(9), 1-36. <https://doi.org/10.15585/mmwr.ss.6809a1>
- Gaete, J., Tornero, B., Valenzuela, D., Rojas-Barahona, C. A., Salmivalli, C., Valenzuela, E., & Araya, R. (2017). Substance use among adolescents involved in bullying: A cross-sectional multilevel study. *Frontiers in Psychology*. <https://doi.org/10.3389/fpsyg.2017.01056>
- Goebert, D., Else, I., Matsu, C., Chung-Do, J., & Chang, J. Y. (2011). The impact of cyberbullying on substance use and mental health in a multiethnic sample. *Maternal and Child Health Journal*. <https://doi.org/10.1007/s10995-010-0672-x>
- Health and Human Service. (2016). The Changing Face of America's Adolescents | HHS.gov. Available at: <https://www.hhs.gov/ash/oah/facts-and-stats/changing-face-of-americas-adolescents/index.html> (Accessed 28 March 2020).
- Litwiller, B. J., & Brausch, A. M. (2013). Cyber Bullying and Physical Bullying in Adolescent Suicide: The Role of Violent Behavior and Substance Use. *Journal of Youth and Adolescence*. <https://doi.org/10.1007/s10964-013-9925-5>
- Miller, E., Jones, K. A., & McCauley, H. L. (2018). Updates on adolescent dating and sexual violence prevention and intervention. *Current Opinion in Pediatrics*, 30(4), 466-471. <https://doi.org/10.1097/MOP.0000000000000637>
- Moore, S. E., Norman, R. E., Suetani, S., Thomas, H. J., Sly, P. D., & Scott, J. G. (2017). Consequences of bullying victimization in childhood and adolescence: A systematic review and meta-analysis. *World Journal of Psychiatry*, 7(1), 60. <https://doi.org/10.5498/wjpv.7.i1.60>
- National Institute on Drug Abuse (NIDA), & Volkow, N. D. (2014). Principles of adolescent substance use disorder treatment: A research-based guide. <https://doi.org/10.1007/BF00198797>
- StopBullying.gov. (2018a). What is Bullying. Available at: <https://www.stopbullying.gov/> (Accessed 28 March 2020).
- Tharp-Taylor, S., Haviland, A., & D'Amico, E. J. (2009). Victimization from mental and physical bullying and substance use in early adolescence. *Addictive Behaviors*. <https://doi.org/10.1016/j.addbeh.2009.03.012>
- Van Ouytsel, J., Torres, E., Choi, H. J., Ponnet, K., Walrave, M., & Temple, J. R. (2017). The Associations Between Substance Use, Sexual Behaviors, Bullying, Deviant Behaviors, Health, and Cyber Dating Abuse Perpetration. *The Journal of School Nursing : The Official Publication of the National Association of School Nurses*, 33(2), 116-122. <https://doi.org/10.1177/1059840516683229>