Bullying Victimization and Substance Use among Adolescents: Using Strain Theory to Examine Patterns across Gender, Race, and Mental Health Status

by

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Abstract

A growing body of research has connected bullying victimization to a number of risk factors in adolescents, including substance use. The current study utilizes Agnew’s revised strain theory as a theoretical framework to examine this relationship, as well as patterns of substance use across gender, race, and mental health status. Data from the 2018 Florida Youth Substance Abuse Survey were used to analyze this relationship among a sample of 12th grade students using three types of bullying victimization (physical, verbal, and cyber) and two types of substances (alcohol and marijuana). Results from the logistic regression analyses provide moderate evidence of this relationship across all models, with some variation present when controlling for gender, race, and mental health status. Recommendations for future research and policies are discussed.

Keywords: Bullying victimization, substance use, adolescence, mental health, General Strain Theory, coping strategies
# Table of Contents

Abstract 2  
Table of Contents 3  
Introduction 4  
Literature Review 5  
- Who Gets Bullied? 5  
- Strain Theory 7  
- Bullying Victimization as a Predictor of Substance Use 9  
- Bullying and Mental Health 12  
- Substance Use and Mental Health Comorbidity 13  
- Sports Participation as an Alternative Coping Strategy 14  
The Current Study 15  
Methods 16  
- Sample 16  
- Dependent Variables 17  
- Table 1.0 - Descriptive Statistics 17  
- Independent Variables 18  
- Covariates 19  
- Hypotheses 20  
Analysis 20  
- Table 2.0 - Past 30 day alcohol use on bullying victimization, girls 21  
- Table 2.1 - Past 30 day alcohol use on bullying victimization, boys 22  
- Table 3.0 - Past 30 day marijuana use on bullying victimization, girls 24  
- Table 3.1 - Past 30 day marijuana use on bullying victimization, boys 25  
Discussion 26  
- Results Summarized 26  
- Research Recommendations 28  
- Limitations 29  
- Policy Implications 31  
Conclusion 33  
References 35
**Introduction**

Adolescence is one of the most formative times in an individual’s life: adverse experiences during this time period have been connected to a number of detrimental outcomes, many of which continue into adult life (Boccio et al., 2022; Mersky et al., 2013). Though broadly defined, adverse childhood experiences (ACEs) include various types of maltreatment and household dysfunction, including peer bullying victimization (Fagan & Novak, 2017). One of the negative outcomes often linked to ACEs is substance use, including greater prevalence, severity of use, and earlier uptake than those who do not experience ACEs (Topper et al., 2011; Anda et al., 1999; Boccio et al., 2022). These patterns often vary based on a number of characteristics, however, including gender, race, and mental health attributes (such as depression, low self-esteem, and anxiety) (Priesman et al., 2018; Tharp-Taylor et al., 2009; Strohacker et al., 2021; Rose & Tynes, 2015). While many sociological and psychological theories have been used to explain these relationships, General Strain Theory (GST) provides a compelling framework to explain why adolescents experiencing peer victimization may have higher rates of substance use. GST proposes that deviant behavior may be a coping mechanism for individuals experiencing strain (often in the form of hardships and/or social pressures) and can be used to help understand why substance use may be more likely among adolescents who have experienced strain via bullying victimization.

The current study, guided by the substantial body of literature in this field and by the tenets of GST, aims to add to the existing body of literature and to better understand the relationship between three types of bullying victimization and substance use. Using data collected via self-report survey from a sample of 12th grade public school students in Florida, this
project uses logistic regression analyses to examine the relationships between victimization and alcohol and marijuana use.

**Literature Review**

**Who Gets Bullied?**

Rates of involvement in bullying behavior (perpetrator and/or victim) across middle and high school students tend to be between 20 and 30% (Carlyle & Steinman, 2007; Spriggs et al., 2007). Rates do, however, tend to vary based on a number of factors, including grade level, gender, race, and type of bullying. For example, 24.2% of 9th grade students reported being bullied over the past year, while only 15.2% of 12th graders reported the same (Lim & Hoot, 2015). This finding supports the consensus among existing literature, much of which suggests that overall rates of bullying tends to decrease over time among middle and high school students (Carlyle & Steinman, 2007). Gender patterns in physical bullying have remained fairly consistent over time, with boys being more likely to engage in physical bullying (as both the aggressor and the victim). Experiences with verbal bullying tend to be similar across genders, but girls are found to engage more in covert, relational bullying than are boys (Beckman et al., 2013).

Research on race and ethnicity patterns within bullying experiences, however, often presents contradictory findings. A review of this literature suggests that the context in which these studies occur may be largely responsible for the lack of consensus: factors such as geopolitics, variations in regional stereotypes, and school-level factors all have been found to play a role in the relationship between race and ethnicity and bullying involvement (Xu et al., 2020). In a 2011 survey of high school students conducted by the Centers for Disease Control
and Prevention (CDC), 20.1% of 9th to 12th grade students were bullied on school property: bullying victimization rates were highest among White students (22.9%), followed by Hispanic students (17.6%) and Black students (11.7%). The researchers applied a socio-ecological framework to address these differences, asserting that bullying is not determined only by characteristics of bullies and victims, but by the social relationships within the groups. As such, these differences in rates may be the result of a number of social contexts and other influences on behavioral development (Lim & Hoot, 2015; Swearer et al., 2010). Similar patterns emerge among 6th to 10th grade students, with White and Hispanic students reporting higher rates of bullying victimization than Black students (Spriggs et al., 2007). While initial research suggested that adolescents with immigrant and ethnic minority backgrounds experienced higher rates of victimization, more recent research has found little evidence to support this idea (Rhee et al., 2017).

Bullying victimization may occur in a number of different forms, but the three main types to be studied in the current project are physical (i.e., assault), verbal (i.e., taunts, threats, or insults), and cyber (i.e., harmful text messages, social network posts, or other aggressive or harmful behaviors conducted online) (Litwiller & Brausch, 2013). Current research suggests that between 20 and 50% of adolescents have experienced cyberbullying over their lifetime, with between 2 and 7% experiencing severe victimization (Álvarez-García et al., 2015). About one in four adolescents are chronically cyberbullied, with previous victimization also acting as an important predictor of future victimization (Korchmaros et al., 2014). Given the somewhat recent development of cyberbullying, discrepancies in the results of studies seeking to understand predictors of cyberbullying victimization are common. Tentative findings, however, suggest that high school girls are at a greater risk for cyber victimization than are boys (Chan et al., 2019).
This may, however, be partially due to the differing patterns of internet habits between genders, as boys are often more likely to play games and watch video clips, while girls have been found to be more active on social networking sites (Beckman et al., 2013). Further, adolescents who engage in other types of risk behaviors online, such as sharing personal information online and talking to strangers, are also more likely to be the victims of cyberbullying (Van Ouytsel et al., 2019). Across all of its forms, bullying victimization has a number of implications for adolescent outcomes. While there are many sociological and psychological theories that aim to explain this relationship, the current study utilizes strain theory in order to provide a foundation for the complex relationships that are examined. Strain may be felt by adolescents who are prevented from reaching a goal or avoiding the detrimental impact of adverse situations, potentially leading to participation in deviant or delinquent behaviors in order to cope.

**Strain Theory**

The current study examines the relationship between bullying victimization and substance use among adolescents in conjunction with Robert Agnew’s general strain theory (GST). Agnew (1992) presents three major types of strain which may influence youth towards delinquent behavior via negative relationships with others. The three types of strain exist when other individuals prevent one from reaching goals that are positively valued, threaten to remove or remove positively valued stimuli possessed by the individual, or present the individual with negatively valued stimuli (Agnew, 1992). Bullying victimization is one example of the third major type of strain, by which physical, verbal, or cyber bullying behaviors are received as negative stimuli by the victim. These stimuli may lead to delinquency or deviant coping mechanisms via a number of avenues; for example, an adolescent may attempt to escape from
the victimization (resulting in truancy), terminate or seek revenge against the source of aggression, or manage the negative affect of the victimization by using illicit substances. The experiencing of negative emotions (including anger, depression, and fear) is more likely following any type of strain, including bullying victimization: GST suggests that adolescents may attempt to manage their negative affect through substance use (Agnew, 1992). The current study, then, aims to evaluate the relationship between strain (bullying victimization) and delinquency (substance use), as well as examining a number of other social factors that have been previously identified as important in this research.

Additional factors that will be considered include measures for gender, negative emotions, other coping strategies, and race. The relationship between strain (including crime victimization, homelessness, and poverty) and substance use has been well documented in recent years, as has the potential mediating roles that race and gender may play in these relationships. Research examining the impact of racial discrimination and fear on adolescent substance use found results that suggest that individuals may experience differential levels of negative affect following the experiencing of strain depending on their race: for example, the relationship between substance use and discrimination was mediated by fear for Hispanic respondents, but not for White or African American respondents (Steele, 2016). On the other hand, some research has found that non-Hispanic White adolescents have been found to be more strongly affected by strain caused by disorganized settings than racial and ethnic minority adolescents, whose likelihood of using substances or other criminal coping mechanisms following these types of strain may be mitigated by greater racial socialization and resilience among these groups. While these findings are not widely representative of patterns often found by researchers studying strain theory, the authors suggest that factors such as racial socialization and increased levels of
resilience may exist among racial ethnic minorities within these disorganized settings, which may help to explain why non-Hispanic White adolescents appear to be more powerfully impacted by strain common to disorganized settings (Ash-Houchen & Lo, 2020; Neblett et al., 2010). The effect of strain on mental health and substance use also tends to vary by gender, as girls tend to report similar or greater levels of depression but lower rates of substance use following the experiencing of a number of strains, possibly due to differences in internalizing and externalizing behavior patterns (Peck et al., 2018; Glassner & Cho, 2018). While the current study focuses on substance use as a coping mechanism for adolescents experiencing strain, there are many other types of coping strategies that may be employed to manage the negative emotions that are triggered by strain. For example, participation in school sports may be used as a nondeviant alternative to substance use: extracurriculars have been found to create strong social ties and reduce stress, both of which may alleviate the negative affect associated with strain (Buckley & Lee, 2021). As such, school sports is included in the current study in the hopes of understanding both the legitimate and illegitimate coping strategies used by adolescents experiencing strain.

**Bullying Victimization as a Predictor of Substance Use**

Many recent studies examine the relationship between bullying perpetration and substance use, but fewer have discussed the relationship between bullying victimization and substance use. Across those that have examined association between peer victimization and substance use, results have been largely inconsistent (Maniglio, 2017). Many studies, however, have found that adolescents who experienced bullying were more likely to use substances than their unvictimized counterparts, even after controlling for gender, grade level, ethnicity, and
prior substance use (Tharp-Taylor et al., 2009; Steele, 2016). A longitudinal analysis of Canadian adolescents found significant correlation between victimization and substance use, and that this relationship could be partially mediated by self-esteem and rejection sensitivity (Nepon et al., 2021). A longitudinal analysis of high school students in 2019 found that increased rates of alcohol consumption did not increase rates of cyberbullying victimization, nor did victimization increase drinking among adolescents who did not already drink: it did, however, find that cyberbullying victimization was correlated with increased drinking among those who were already a drinker (Chan et al., 2019). Further, bullying victimization during young adolescence is correlated with diminished moods in later adolescence: these diminished moods are further correlated with substance use into the late teenage years and even into early twenties (Glassner & Cho, 2018). The results of these longitudinal analyses provide some evidence for the temporal ordering of bullying victimization and substance use, as well as the potential mediating effects of mental health status.

The relationship between bullying victimization and substance use often varies by gender, race, and other personal or contextual characteristics. Differing rates of substance use among different sub-populations should also be taken into account: for example, Black and Latinx students often report lower rates of alcohol use than their White counterparts, while Native American students have been found to have greater marijuana use (Eitle & Eitle, 2007; Lee et al., 2021). Among female high school students in Texas, those who experienced both school and cyberbullying had a higher likelihood of vape use than did those who had not been bullied within the past year, but there was no significant relationship for male students: it is possible that this finding provides evidence in favor of the theory that female adolescents are more prone to internalized behaviors (such as depression) that may mediate positively in the
relationship between bullying victimization and substance use (Ihongbe et al., 2021). Notably, “vape use” in the previous study refers to the use of any electronic vapor product, regardless of what substance was vaped; these findings, then, should only be taken as tentatively supportive of the gendered differences in the relationship between bullying victimization and substance use. Similar patterns, however, were found when testing directly for the mediating effect of depression: for male students, the association between victimization and substance use (including alcohol, cigarette, and marijuana use) was found to be direct (no mediating effect via depression), while controlling for depression nullified any significant direct effects of victimization on substance use for female students (Luk et al., 2010). The same relationship was not found among female gender-nonconforming students, but the authors propose that this was due to similar violence victimization rates among female gender-nonconforming and gender-conforming students, while the male gender-nonconforming students in the same study faced significantly greater violence victimization and subsequently, greater substance use rates (Lowry et al., 2020). The type of bullying victimization experienced has also been found to predict varying levels of substance use: while both traditional bullying (such as physical, verbal, or relational) and cyber bullying have positively predicted substance use, cyber bullying accounted for slightly more variance in this relationship (Litwiller & Brausch, 2013; Hay et al., 2010). Studies focused only on verbal bullying have found inconsistent results, with some reporting direct positive results and others finding no relationship (Steele, 2016; Hay et al., 2010). The relationship between bullying victimization and substance use is complex and often mediated by a number of factors, including mental health and negative emotions.
Bullying and Mental Health

Bullying victimization has long been linked to detrimental mental health outcomes in adolescents, especially as technology and social media have provided another route through which youth may experience bullying: both traditional and cyberbullying victimizations have been significantly associated with depression, anxiety, and suicidality (Strohacker et al., 2021; Rose & Tynes, 2015). Increased research into adverse childhood experiences (ACEs) and their effects on later physical and mental health continues to suggest that these experiences, such as bullying victimization, may have a significant impact on adolescents and their later health outcomes (Mersky et al., 2013). Following childhood exposure to bullying victimization, increased levels of anxiety and cognitive disorganization were found to be present over the following two years among a significant number of adolescents (Singham et al., 2017). A number of factors, including the type of bullying experienced, demographic characteristics, and perceived support from others, have been found to play a role in the relationship between bullying victimization and mental health, however.

While the literature provides overwhelming evidence of a positive relationship between bullying victimization and mental health outcomes, there is less consensus on how this relationship may vary based on the type of bullying experienced. The relationship between cyber bullying and mental health outcomes, especially, appears to have distinct differences than that of traditional bullying and mental health. Among German adolescents, psychological cyberbullying has been found to be particularly important in influencing mental health, followed by relational bullying and sexual cyberbullying (among girls), with physical bullying having the smallest effect on mental health (particularly among boys) (Baier et al., 2019). Additionally, cyber victims have been found to report higher depression than bullies or bully-victims (adolescents
who engage in bullying as both perpetrators and victims), which was not a distinction that was found among adolescents that engaged in traditional bullying behaviors (Wang et al., 2011). A sampling of Spanish adolescents, however, suggested that victims of cyberbullying less frequently reported experiencing negative emotions than victims of traditional bullying (Quintana-Orts & Rey, 2018). The types of negative emotions felt by victims also vary across forms of bullying experienced: while the most frequently reported emotion across all types of bullying is anger, victims of cyberbullying have been found to report the least frequently feeling “defenseless” and “embarrassed.” There are a number of possible reasons for this, including differences in how the situations are perceived in relation to the self or greater feelings of control over the situation (Ortega et al., 2012). The variation in results throughout the literature suggests that there are likely additional factors at play that dictate how bullying affects the mental health of adolescents: the current study seeks to further examine this relationship and add to the existing body of literature. While bullying victimization has been linked to both substance use and mental health, there is also an increasing amount of evidence to suggest that mental health disorders and substance use disorders are likely to be found in conjunction with one another.

**Substance Use and Mental Health Comorbidity**

A review of over seventy studies examining adolescent substance use found that almost all studies that considered mental health found significant differences, suggesting that the prevalence of comorbid substance use and mental health disorder is high, especially among certain subpopulations (Halladay et al., 2020). Adolescents that use tobacco are more likely than non-users to experience internalizing and externalizing problems, especially those who use multiple types of tobacco (Conway et al., 2018). Among marijuana users, substance use
disorders are more likely to co-occur with externalizing disorders (such as ADHD and behavior or conduct problems) in adolescence and with internalizing disorders (such as depression or anxiety) in young adulthood (though comorbidity rates of all three disorders were high among all respondents) (Hawke et al., 2018). Further, greater depressive symptoms in adolescence have been associated with faster rates of e-cigarette progression, suggesting that mental health may not only be correlated with substance use uptake, but severity of use (Moustafa et al., 2021). Depression has been found to be a mediating factor between bullying and other deviant coping mechanisms, including suicidal thinking and attempts, as well as substance use (Reed et al., 2015; Strohacker et al., 2021). Temporal ordering around mental health disorders and substance use, however, can be difficult to ascertain: the literature suggests that the two often influence one another or are both impacted by a third measure, creating challenges in understanding causation. As such, the present study aims only to examine the potential correlation of mental health with bullying victimization and substance use.

Sports Participation as an Alternative Coping Strategy

Participation in school sports has a seemingly complex relationship with substance use in the existing body of literature: while recent research suggests that time spent in unstructured socializing is more strongly correlated with substance use, other studies suggest that high sport involvement is directly correlated with increased alcohol consumption (Meldrum & Leimberg, 2018; Cristello et al. 2020). Cigarette smoking, however, has been found to be less frequent among high school athletes (Veliz, et al., 2017). The type of sports program that students engage in may have different associations: while varsity sports participation has been found to increase the likelihood of binge drinking and e-cigarette usage, intramural sports participation instead
appears to act as a protective factor against substance use (Williams et al., 2020). Further, non-contact sports also have been found to have a protective factor against substance use (Veliz et al., 2015). In accordance with GST, the current study aims to examine school sports participation as a potential alternative coping strategy to substance use for adolescents facing bullying victimization.

**The Current Study**

This study seeks to examine the relationship between bullying victimization and substance use among a sample of 12th grade students in Florida public schools. Based on the existing body of literature, the guiding research question is: How are different types of bullying victimization related to different types of substance use among adolescents?

In order to answer this question, six empirical models will be estimated, each tested separately for girls and boys. Guided by the literature, I first hypothesize that all types of bullying victimization are positively related to the consumption of alcohol. I also hypothesize that all types of bullying victimization are positively correlated with marijuana use. Though the strength of the relationships are expected to vary across gender, I expect these relationships to be largely true for both girls and boys.
Methods

Sample

The current study relies on data from the 2018 Florida Youth Substance Abuse Survey (FYSAS), which is part of a longitudinal trend survey of public middle schools and high schools in Florida. The survey, which has been distributed annually since 1999, is conducted through the collaborative efforts of the Florida departments of Health, Education, Children and Families, Juvenile Justice, and the Governor’s Office of Drug Control. The survey was developed to assess the current prevalence of “problem behaviors” (substance use and delinquency), as well as a variety of risk and protective factors within the community. In order to produce representative estimates at both the state and county level, the survey was distributed via a stratified, two-stage cluster sampling methodology. 385 middle schools and 334 high schools were selected to participate, within which classrooms were randomly selected to participate. Overall participation rates were 73.8% for middle school and 66.5% for high school: after completing five response validation tests, the final sample size for the 2018 FYSAS is 54,611 students (Florida Youth Substance Abuse Survey, 2018). The current study, however, isolates 12th grade students for analysis: as such, the total sample for this study is 4,881 students. Table 1.0 provides descriptive statistics for this sample. In keeping with the trends seen in the literature and to allow for gender differences within the relationship being studied, models for boys and girls are run and reported separately in these analyses.
Dependent Variables

Measures from the 2018 FYSAS indicating past 30-day alcohol and marijuana use were used to construct the two dependent variables. To measure the frequency of alcohol use, respondents were asked, “On how many occasions (if any) have you consumed alcohol during the past 30 days?” To measure the frequency of marijuana use, respondents were asked, “On how many occasions (if any) have you used marijuana or hashish during the past 30 days?” The response options for each were “None,” “1-2 occasions,” “3-5 occasions,” “6-9 occasions,” “10-19 occasions,” “20-39 occasions,” and “40 or more occasions.” Each variable was dichotomized, with no reported use over the past 30 days coded as 0 and consuming the substance one or more times coded as 1.

Table 1.0 – Descriptive Statistics

<table>
<thead>
<tr>
<th>Variable</th>
<th>Boys</th>
<th>Girls</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td>Mental health</td>
<td>1.047</td>
<td>1.420</td>
</tr>
<tr>
<td>Sports participation</td>
<td>.403</td>
<td>.491</td>
</tr>
<tr>
<td>Race</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Native American</td>
<td>.031</td>
<td>.174</td>
</tr>
<tr>
<td>Asian</td>
<td>.039</td>
<td>.194</td>
</tr>
<tr>
<td>Black</td>
<td>.171</td>
<td>.377</td>
</tr>
<tr>
<td>Latinx</td>
<td>.226</td>
<td>.418</td>
</tr>
<tr>
<td>NH/PI</td>
<td>.012</td>
<td>.110</td>
</tr>
<tr>
<td>White</td>
<td>.610</td>
<td>.488</td>
</tr>
<tr>
<td>Other</td>
<td>.038</td>
<td>.192</td>
</tr>
<tr>
<td>Bullying victimization</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physically</td>
<td>.362</td>
<td>.810</td>
</tr>
<tr>
<td>Verbally</td>
<td>.826</td>
<td>1.170</td>
</tr>
<tr>
<td>Cyber</td>
<td>.318</td>
<td>.758</td>
</tr>
<tr>
<td>Consumed alcohol in past 30 days</td>
<td>.299</td>
<td>.458</td>
</tr>
<tr>
<td>Used marijuana in past 30 days</td>
<td>.231</td>
<td>.421</td>
</tr>
</tbody>
</table>
Both variables were dichotomized primarily to account for skewed distributions within the variables and to follow the natural breaks within the data: 70% of the sample had not consumed alcohol within the past 30 days, while 78% had not used marijuana within the past 30 days. Another 17% of 12th grade students had consumed alcohol on 1-2 occasions in the past 30 days, and only 6% had used marijuana on 1 or 2 occasions. Only 13 and 16% of the sample had consumed alcohol or marijuana, respectively, on more than 2 occasions. As such, dichotomizing the dependent variables was the most suitable method for analyzing these data.

**Independent Variables**

The primary independent variable in the current study is bullying victimization, for which the survey articulates three types. The first is physical bullying victimization, which was measured by asking respondents, “How often has someone hit, kicked or shoved you, caused you physical harm/injury, or taken your money or belongings in the past 30 days?” The second independent variable is verbal bullying victimization, which was measured by asking respondents, “How often have you been taunted, teased, experienced name-calling, or been excluded or ignored by others in a mean way?” The third independent variable is cyber bullying victimization, which was measured by asking respondents, “How often has someone sent mean emails, text messages, IM’s or posted hurtful information on the Internet about you?” The response options for all three of these questions were “Never” (=0), “Once or twice” (=1), “A few times” (=2), “Many times” (=3), and “Every day” (=4). These response options, while easier for students to understand and answer than numerical options, do introduce questions of reliability: “a few times” and “many times,” especially, may mean different experiences with bullying victimization for each respondent. As such, while none of these variables were recoded,
the empirical analysis to be conducted focuses primarily on comparisons between those who were never bullied and those who were bullied every day in the past 30 days. This allows for increased, though not certain, reliability within the measure.

**Covariates**

A number of covariates are included in order to isolate the independent relationships between bullying victimization and substance use. Covariates were selected based on the existing body of literature, which suggests that race, mental health status, and school sports participation are all correlated with bullying victimization and substance use. Gender is coded as a dichotomous variable, with female coded as 0 and male coded as 1. Race was measured by a question allowing respondents to select from the following: American Indian/Native American, Asian, Black/African American, Spanish/Hispanic/Latinx, Native Hawaiian/Pacific Islander, White/Caucasian, and Other. For this essay, I created a set of dichotomous variables for each, with “White/Caucasian” omitted as the reference category.

A scale for mental health status was created using four items where respondents were asked to indicate if they strongly disagreed, somewhat disagreed, somewhat agreed, or strongly agreed with the following statements: “Sometimes I think that life is not worth it,” “At times I think I am no good at all,” “All in all, I am inclined to think that I am a failure,” and “In the past year, I have felt depressed or sad MOST days, even if I felt ok sometimes.” Responses to these measures are coded so that higher numbers represent a greater experiencing of negative emotions. These items were dichotomized so that 0 indicated an absence of negative emotions and 1 indicated the presence of negative emotions before then being indexed into a mental health
status scale ranging from 0 to 4, where 0 indicates that the respondent disagreed with all four measures and 4 indicates that the respondent agreed with all four negative emotion measures (α=0.819). This scale is identical to those used by previous papers using FYSAS data (Boccio & Jackson, 2021). The measure for school sports participation is a binary variable created from a question that asked respondents to select “Yes” or “No” to the following question: “Do you actively participate in school sports?”

Hypotheses

Guided by the existing literature, the current study tests two hypotheses. The first hypothesis is that all three types of bullying victimization will be significantly and positively correlated with the consumption of alcohol over the past 30 days among the sample of 12th grade students. The second hypothesis is that all three types of bullying victimization will be significantly and positively correlated with the use of marijuana over the past 30 days among the sample of 12th grade students. Further, though the models do not expressly test for the statistical differences between types of bullying victimization and between types of substance use (largely due to issues of multicollinearity), I expect that the models will show stronger associations between cyber bullying and substance use than with other types of bullying victimization.

Analysis

Six models were estimated to test the relationships between bullying victimization and substance use, with each model being run separately for boys and girls: as such, twelve total
models are estimated. Table 2.0 presents the results from the three logistic models that test bullying victimization as it related to alcohol consumption among girls, while Table 2.1 presents the results of these same models run among boys. Similarly, Tables 3.0 and 3.1 present the results for the three logistic regression models that test bullying victimization as it relates to marijuana use. Because logistic regression is used in this analysis, the coefficients presented can be interpreted as the change in log odds with each unit change in the independent variable. Using the exponential function (i.e. $e^{\text{coef}}$) allows for the interpretation of the coefficients as the change in odds relative to change(s) in the independent variable(s).

<table>
<thead>
<tr>
<th>Table 2.0 – Logistic regression of past 30 day alcohol use on bullying victimization among girls</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Daily Physical Bullying</strong></td>
</tr>
<tr>
<td><strong>Coef.</strong></td>
</tr>
<tr>
<td>Physical</td>
</tr>
<tr>
<td>Verbal</td>
</tr>
<tr>
<td>Cyber</td>
</tr>
<tr>
<td>Mental health</td>
</tr>
<tr>
<td>Sports participation</td>
</tr>
<tr>
<td>Race</td>
</tr>
<tr>
<td>Native American</td>
</tr>
<tr>
<td>Asian</td>
</tr>
<tr>
<td>Black</td>
</tr>
<tr>
<td>Latinx</td>
</tr>
<tr>
<td>NH/PI</td>
</tr>
<tr>
<td>Other</td>
</tr>
</tbody>
</table>

n = 2,327   n = 2,327   n = 2,326

*** p<0.01, ** p<0.05, * p<0.1

The first three rows of Table 2.0 provide the coefficients and confidence intervals for the logistic regression of alcohol consumption on bullying victimization among 12th-grade girls. While all three coefficients on bullying victimization are positive, with daily physical victimization increasing the odds of alcohol consumption by almost 3 times ($e^{1.033}=2.81$), none of these three coefficients are statistically significant at the 10% level. The mental health coefficients are statistically significant but small within the physical and verbal victimization
models: the largest of these coefficients is .122, which indicates that each additional negative mental health incidence increases the odds of alcohol consumption by 13% ($e^{0.122}=1.13$), holding constant victimization, sports participation, and race.

The coefficients on sports participation are significant and positive across all three models, suggesting that girls who play at least one school sport are about 1.5 times more likely to have consumed alcohol in the past 30 days than those who do not play a school sport ($e^{0.365} = 1.44$), holding constant victimization, mental health, and race. All coefficients on race are negative, suggesting lower rates of alcohol consumption among girls in all of these sub-populations than among White girls, though only the coefficients on Black girls is statistically significant at the 1% level: holding constant, all other factors, Black girls are about half as likely to have consumed alcohol in the past 30 days than their White counterparts ($e^{-0.764} = 0.534$).

Table 2.1 – Logistic regression of past 30 day alcohol use on bullying victimization among boys

<table>
<thead>
<tr>
<th></th>
<th>Daily Physical Bullying</th>
<th>Daily Verbal Bullying</th>
<th>Daily Cyber Bullying</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Coef.</td>
<td>95% C. I.</td>
<td>Coef.</td>
</tr>
<tr>
<td>Physical</td>
<td>.393</td>
<td>-.517 – 1.304</td>
<td>.029</td>
</tr>
<tr>
<td>Mental health</td>
<td>.052</td>
<td>-.023 – .128</td>
<td>.095**</td>
</tr>
<tr>
<td>Race</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Native American</td>
<td>.600**</td>
<td>.091 – 1.110</td>
<td>.668**</td>
</tr>
<tr>
<td>Asian</td>
<td>-.962***</td>
<td>-.1.531 – -.908</td>
<td>-.915***</td>
</tr>
<tr>
<td>Black</td>
<td>-1.216***</td>
<td>-.1.524 – -.909</td>
<td>-1.217***</td>
</tr>
<tr>
<td>Latinx</td>
<td>-1.414***</td>
<td>-.641 – -.187</td>
<td>-1.409***</td>
</tr>
<tr>
<td>NH/PI</td>
<td>.611</td>
<td>-.213 – 1.434</td>
<td>.620</td>
</tr>
<tr>
<td>Other</td>
<td>-.768***</td>
<td>-.1.001 – -.040</td>
<td>-.431*</td>
</tr>
</tbody>
</table>

n = 2,289 n = 2,289 n = 2,288

*** p<0.01, **p<0.05, * p<0.1

The first three rows of Table 2.1 provide the coefficients and confidence intervals for the logistic regression of alcohol consumption on bullying victimization among 12-grade boys.

While all three coefficients on bullying victimization are positive, only the coefficient on cyber...
bullying victimization is significant at the 5% level. This result suggests that boys who experience regular cyber victimization are almost three times as likely to have consumed alcohol in the past 30 days than non-bullied boys ($e^{1.039}=2.83$). The mental health coefficient on verbal bullying victimization is the only that carries statistical significance and suggests that boys have odds of alcohol consumption that are about 10% higher for each additional negative mental health attribute ($e^{0.095}=1.10$), holding constant victimization, sports participation, and race.

Similarly to the models run for girls, the coefficients on sports participation are significant and positive across all three models, suggesting that boys who play at least one school sport are about 1.5 times more likely to have consumed alcohol in the past 30 days than those who do not play a school sport ($e^{0.356}=1.43$), holding constant victimization, mental health, and race. The coefficients on the race variables are much less straightforward for 12th-grade boys than for their female counterparts: the coefficients for Asian, Black, and Latinx boys are all negative and statistically significant, suggesting that these sub-populations have decreased odds of having consumed alcohol than their White counterparts (odds of use are about 60%, 70%, and 34% lower, respectively). Native American boys, however, are almost twice as likely than White boys to have consumed alcohol in the past 30 days ($e^{0.668}=1.95$), holding constant victimization, mental health, and sports participation.

The first three rows of Table 3.0 provide the coefficients and confidence intervals for the logistic regression of marijuana use on bullying victimization for 12th-grade girls. All three coefficients on victimization are positive, but only verbal and cyber victimization are significant (at the 10% and 1% levels, respectively). This suggests that girls who experience regular cyber victimization are over five times as likely to have used marijuana in the past 30 days than those who did not experience victimization ($e^{1.683}=5.38$), while those experience regular verbal
victimization are about twice as likely to have used marijuana than their non-bullied counterparts \((e^{0.819}=2.27)\).

**Table 3.0 – Logistic regression of past 30 day marijuana use on bullying victimization among girls**

<table>
<thead>
<tr>
<th></th>
<th>Daily Physical Bullying</th>
<th></th>
<th>Daily Verbal Bullying</th>
<th></th>
<th>Daily Cyber Bullying</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Coef.</td>
<td>95% C. I.</td>
<td>Coef.</td>
<td>95% C. I.</td>
<td>Coef.</td>
<td>95% C. I.</td>
</tr>
<tr>
<td>Physical</td>
<td>1.347</td>
<td>-.351 – 3.045</td>
<td>.819*</td>
<td>-.106 – 1.743</td>
<td>1.683***</td>
<td>.522 – 2.845</td>
</tr>
<tr>
<td>Verbal</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cyber</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mental health</td>
<td>.174***</td>
<td>.100 – .247</td>
<td>.168***</td>
<td>.071 – .264</td>
<td>.171***</td>
<td>.086 – .256</td>
</tr>
<tr>
<td>Sports participation</td>
<td>.042</td>
<td>-.200 – .283</td>
<td>.178</td>
<td>-.120 – .477</td>
<td>.120</td>
<td>-.156 – .396</td>
</tr>
<tr>
<td>Race</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Native American</td>
<td>.278</td>
<td>-.293 – .848</td>
<td>.208</td>
<td>-.370 – .786</td>
<td>.210</td>
<td>-.370 – .790</td>
</tr>
<tr>
<td>Asian</td>
<td>-.455*</td>
<td>-.990 – .081</td>
<td>-.431</td>
<td>-.962 – 0.100</td>
<td>-.449</td>
<td>-.990 – .091</td>
</tr>
<tr>
<td>Black</td>
<td>.109</td>
<td>-.145 – .362</td>
<td>.113</td>
<td>-.143 – .369</td>
<td>.193</td>
<td>-.066 – .452</td>
</tr>
<tr>
<td>Latinx</td>
<td>-.048</td>
<td>-.300 – .204</td>
<td>-.056</td>
<td>-.308 – .197</td>
<td>-.014</td>
<td>-.269 – .240</td>
</tr>
<tr>
<td>NH/PI</td>
<td>.267</td>
<td>-.645 – 1.179</td>
<td>.368</td>
<td>-.532 – 1.268</td>
<td>.212</td>
<td>-.708 – 1.132</td>
</tr>
<tr>
<td>Other</td>
<td>-.033</td>
<td>-.550 – .484</td>
<td>.026</td>
<td>-.489 – .542</td>
<td>-.020</td>
<td>-.543 – .503</td>
</tr>
</tbody>
</table>

*** p<0.01, **p<0.05, * p<0.1

While substantially large, the coefficient on physical victimization is not statistically significant at the 10% level. Conversely, the coefficients on the mental health variable are all significant at the 1% level but are relatively small, with each additional negative emotion attribute increasing the odds of marijuana use by about 20% \((e^{0.171}=1.19)\), holding constant all other included factors. Neither race nor sports participation are statistically significant in a meaningful way, suggesting that patterns of marijuana use among 12th-grade girls are largely similar across these categories.

Among 12th-grade boys, patterns of marijuana use appear to be fairly different: Table 3.1 provides the coefficients and confidence intervals for the logistic regression of past 30 day marijuana use on bullying victimization among boys. Of the coefficients on victimization, only those for physical and cyber victimization are significant at the 10 and 5% levels, respectively.
Boys who are regularly physically victimized are over twice as likely to use marijuana than their non-bullied counterparts ($e^{0.801}=2.23$), while boys who are cyber bullied are almost three times as likely to have used marijuana than non-bullied boys ($e^{1.082}=2.95$). Unlike the girls, mental health is largely uncorrelated with patterns of marijuana use in boys, ceteris paribus: within the verbal model only, negative emotion attributes increase the odds of marijuana use by 9% ($e^{0.083}=1.09$). Sports participation also appears to be largely uncorrelated with marijuana use in the sample of 12th-grade boys. Some differences can be seen in the race variables, however. Both Native American and Native Hawaiian/Pacific Islander populations have increased odds of marijuana use than the White reference category (two times and two and a half times as likely, respectively), while Latinx boys report odds of marijuana use that are about 25% lower than White 12th-grade boys.
**Discussion**

**Results Summarized**

The current study used data from the 2018 Florida Youth Substance Abuse Survey to examine the relationship between bullying victimization and substance use among a sample of 12th grade students in Florida public high schools. It is important to note that, because the current data are cross-sectional in nature, temporal ordering of the variables cannot be confirmed. As such, the analyses at hand aim only to find evidence of correlation between the variables and cannot be used to indicate causality or any form of mediation (like that of mental health status between victimization and substance use). This research utilized General Strain Theory as a theoretical framework for how these variables may be related: guided by the existing literature and the concepts proposed by GST, two hypotheses were proposed and tested.

The first hypothesis, which predicted that bullying victimization would be significantly and positively correlated with the consumption of alcohol, was unsupported among girls and only supported by one model among boys. Only cyber bullying victimization was positively correlated with past 30 day alcohol consumption, with victimized boys almost three times as likely to have consumed alcohol than those who were not bullied. This suggests that cyber bullying may be more powerful in predicting alcohol use than physical or verbal victimization, but further research testing these relationships against one another directly is necessary to provide more grounded evidence for these findings. When paired with the lack of significant relationships in the girls models, the models described in Table 2.1 provide evidence in support of the trend seen in the literature suggesting gendered differences in the relationship between victimization and alcohol consumption (Priesman et al., 2018; Tharp-Taylor et al., 2009).
Differences in the significance of mental health in alcohol consumption also suggest gender differences, with mental health more often predicting alcohol use in girls than in boys. Racial differences in predicting alcohol use also vary by gender: among girls, only Black students had significantly different patterns of use than White students. Among boys, more complex patterns emerge. Asian, Black, and Latinx students all have substantially decreased odds of alcohol consumption, while Native American students have significantly increased odds of use when compared to White students. The only covariant that did not appear to support gendered differences in patterns of alcohol consumption was participation in school sports: consistent with trends seen in literature, both boys and girls are about one and a half times as likely to have consumed alcohol if they were involved in at least one school sport (Cristello et al. 2020).

The second hypothesis, which predicted that bullying victimization would be significantly and positively correlated with marijuana use, was supported in two out of three models for both boys and girls. Among girls, verbal and cyber victimization were both significantly correlated with marijuana use, with regular cyber victimization increasing the odds of marijuana use by over five times and verbal victimization doubling the odds of marijuana use. Among boys, cyber victimization also appears to impact marijuana use most substantially, with victimized boys about three times as likely to have used marijuana. Verbal victimization is not significant as it is for girls, however; instead, physical victimization is the second significant model, with those who are physically bullied twice as likely to use marijuana than their non-bullied counterparts. As with the models run for alcohol use, gender differences are also apparent in the covariates. Mental health appears to have an even greater association with marijuana use than with alcohol use among girls, while the coefficients on mental health are consistently insignificant among boys. Additionally, there are insubstantial racial differences in marijuana use
among girls, while boys appear to be more complex: Native American and Native Hawaiian/Pacific Islander students are more likely to have used marijuana than the White reference category, while Latinx students are less likely to have used marijuana than the White reference category. Consistent with the alcohol use models, however, there are no significant gender differences in the relationship between sports participation and marijuana use: in this case, sports participation was uncorrelated with marijuana use for both genders. This finding also follows the trend seen in the literature suggesting that sports participation often act as a protective factor against many types of substances (excluding alcohol) (Veliz et al., 2015; Veliz et al., 2017; Williams, et al., 2020).

**Research Recommendations**

Further, though the current study did not explicitly test for relationships beyond those between each type of bullying victimization and substance use, some patterns emerged that provide grounds for future research. First, the differences in coefficient magnitude and significance between types of bullying suggest that the type of bullying experienced may have differential impacts on substance use: for example, physical bullying and cyber bullying both had greater significance levels and effect size than did verbal bullying on both alcohol and marijuana use, which may indicate differences in how these types of victimization impact adolescents. Additionally, different sample sizes and patterns of use between alcohol and marijuana suggest that not all substance use should be treated equally. This is especially true when studied in conjunction with other coping strategies (such as sports participation), indicating that further research more directly testing these effects with different types of extracurriculars and substances should be conducted. The significant differences in patterns of substance use between girls and
boys found in this research should also continue to be studied, with future research testing the models directly against one another to confirm the patterns found in the current study. Changing perceptions of risk surrounding marijuana, availability, and peer group may all be factors that affect adolescents’ likelihood of use when compared to alcohol or other substances. Further research should be conducted to determine the validity of these initial patterns.

Limitations

Several limitations exist in the current study but the greatest is the cross-sectional nature of the data, which limits the ability to assert any causal relationships between the independent variables (namely, bullying victimization and mental health) and the outcomes (alcohol and marijuana use). This is especially true of the potential relationship between all three of these variables: while it is proposed that mental health status plays a mediating role in the relationship between victimization and substance use, this cannot be tested with cross-sectional data. Research hoping to analyze this relationship would need to utilize longitudinal data in order to better understand the temporal ordering of these concepts. Similarly, the role of sports participation as an alternative coping strategy requires further research to determine its status as a potential protective factor against substance use among adolescents who experience bullying victimization. Further, the sample may lack validity due to the nature of the data-collection: while self-report surveys are often used in this field, they are not entirely free from the possibility of response bias. Additionally, the results of the current study cannot be generalized outside of the sample population, which is 12th grade public school students in Florida. Lastly, there are a number of other potential confounding variables that could not be included due to
data availability and project scope which could impact how bullying victimization and substance use are related among adolescents.

The literature suggests a number of these possible confounders. For example, mental health status and substance use levels have been found to be worse among adolescents suffering bias-based harassment than among those who suffer non—bias-based harassment (Russell et al., 2012). As such, the prevalence of bias-based harassment may act as a confounding variable, impacting mental health and substance use. Further, gender nonconforming students have been found to be at a higher risk for both violence victimization and substance use, though this association is much stronger for male students (as female gender nonconforming students did not experience significantly higher rates of violence victimization than their gender conforming counterparts) (Lowry et al., 2020). There are a number of peer factors that also may play a role in the likelihood of both bullying victimization and substance use. For example, adolescents with fewer friends are more likely to be bullied, while the majority of marijuana users obtain marijuana from their friends: as such, it is possible that substance access varies along the same lines as likelihood of victimization (Preisman et al., 2018; Perren & Alsaker, 2006; King et al., 2016). Unstructured socializing with peers also increases the likelihood of substance use and could theoretically be associated with increased risk of victimization due to a lack of intervention or supervision (Meldrum & Leimberg, 2018). Further, much of the recent literature includes adolescents who are bullies, victims, and bully-victims (individuals who are both victims and perpetrators): in fact, some research indicates that bully-victims had the greatest levels of comorbid disorders (including substance use) out of the three groups (Kaltiala-Heino et al., 2000). Additionally, research into bullying victimization and suicidality suggests that substance use may mediate this relationship: this implies an extremely complex relationship between
mental health and substance use that could not easily be tested for temporal ordering (Litwiller & Brausch, 2013). Any number of these, or other, factors may play a role in the analyses conducted in this study: further research that does not have the same limiters as the current study should be conducted to ascertain the deeper connections among these concepts in order to best inform educators and legislators.

**Policy Implications**

Despite the limitations of the current study, the results do provide some evidence in favor of a number of possible policies meant to address bullying victimization and substance use. First, schools should continue to prioritize anti-bullying programs and campaigns in order to address bullying victimization at its root. While many elementary, middle, and high schools already employ anti-bullying programs via formal school-wide policies, classroom rules, assemblies, curriculum, and specific intervention-based practices, policies aiming to improve and add to these practices could increase program efficacy and decrease the prevalence of bullying (Jiménez-Barbero et al., 2016; Ttofi & Farrington, 2009). Additionally, the significant relationship between cyber bullying victimization and substance use found in this study may suggest that programs specifically addressing internet use and safety among adolescents could be beneficial in preventing cyber bullying.

Second, schools should continue to improve mental health services in order to help adolescents develop healthier strategies for processing and coping with stressors (such as bullying victimization), so that fewer adolescents might feel the need to turn to substance use to cope with strain. This research provides some evidence in favor of popular theories that promote
“resilience” as a protective factor among adolescents: programs that emphasize optimism, self-efficacy, tolerance, support, and other related concepts have been found to reduce the likelihood of depression and anxiety among adolescent victims of bullying (Moore & Woodcock, 2017). Given the significant relationship between bullying victimization and substance use found in this study, I suggest that programs teaching resilience and other healthy coping mechanisms are implemented in schools in order to minimize the harmful effects of bullying. Further, extracurriculars such as school sports should continue to be encouraged, though educators should be cautious to assume that all sports offer the same protective factors: programs such as Switzerland’s “Cool and Clean” program (through which adolescent athletes are given additional interpersonal and holistic training to help prevent substance use) should be explored to address the increased odds of alcohol use among student athletes (Wicki et al., 2018). Research that has found that drug use and other offending behaviors have similar risk factors for adolescents suggests that a policy that aims to “catch” these individuals and give them healthier coping strategies before drug use begins may also help to prevent other offending behaviors (Aston, 2015). While programs like this sound effective on paper, it is important to understand the nuance in mental health and drug education programs in schools.

While drug education is one often-used strategy for impacting substance use among adolescents, the structure and implementation of the program is crucial in determining its efficacy. Programs that aim to deter or delay substance use rather than addressing how to minimize the harm and risks involved with drug use have long been the norm in the United States, even as research continues to indicate that this is not the most effective form of drug education. The most common of these deterrence-based programs is the Drug Abuse Resistance Education (DARE) program, which was introduced in 1983 and involves a curriculum taught by
uniformed officers, based around the dangers of peer pressure and drug use. As early as 1996, research suggested that DARE programs were largely ineffective and, in some cases, appeared to be correlated with increased rates of substance use (Clayton et al., 1996; Weiss et al., 2008). While so-called “evidence-based” practices are becoming more common in response to the lack of positive trends following DARE implementation, evaluations of these programs often face a lack of concrete guidelines determining “success” and “failure,” as well as what constitutes an “evidence-based” practice (Gorman & Huber, 2009). Despite these complexities in program evaluation, research tentatively suggests that harm reduction school drug education programs are correlated with increased knowledge about various substances, increased communication with parents about substance use, decreased alcohol consumption, and decreased associated harms when compared to students who had received the drug education normally provided by their schools (Midford et al., 2012). Harm reduction education programs include curriculum that focuses on increasing knowledge, enhancing problem-solving strategies, deconstructing social pressures and perceived norms about substance use, and resilience education (Midford et al., 2012). The results of the current study provide support for education that provides alternative coping mechanisms to adolescents experiencing bullying victimization, as well as knowledge about how to use substances safely for those who may still choose to use them.

**Conclusion**

In the ever-changing tides of the “War on Drugs,” adolescents are often an under-researched and under-supported group. Guided by GST and the body of existing literature, the current project aimed to gain a better understanding of how bullying victimization may be
correlated with substance use and to make suggestions for future research and policies. Using data from the 2018 Florida Youth Substance Abuse Survey, the logistic regression analyses that were conducted provided evidence to support the hypotheses that bullying victimization would be positively and significantly correlated with substance use. Despite a number of limitations, this research adds to the growing body of literature in the field and provides grounds for future research and policymaking decisions. Moving forward, it is the hope that policies informed by this field of research will be implemented in order to better support the mental health and education of adolescents and provide better outcomes for those affected by bullying victimization and substance use.
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