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Predictors of Binge Drinking in High School Youths in Montgomery County, Maryland

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Walden University
2018

Abstract

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by

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MS, Eastern Michigan University, 2005

BS, University of Buea, 2001

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Philosophy

Public Health, Community Health Education

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Abstract

Underage drinking is a major problem in the United States, leading to increased morbidity and mortality. About 43,000 deaths a year result from binge drinking in youths at a cost of $24 billion in 2010 to the U.S. economy. The purpose of this quantitative dissertation was to examine the predictors of binge drinking in high school youths in a highly racial diverse community of Montgomery County, Maryland. The social ecological model was the theoretical framework used for this study due to the presence of both personal and contextual factors that influence behavior. Using binary logistic regression to analyze data from the Youth Risk Behavior Surveillance System 2014, the association between being bullied, suicidality, substance use, protective factors, and binge drinking was tested. Results from single models indicated that there was an association with all independent variables predicting binge drinking. Based on effect size, Asians had the highest risk (For RQ1, OR =3.57; RQ2, OR= 3.08; RQ4, OR=1.72) of binge drinking for all independent variables except marijuana use in which Blacks had the highest risk; OR = 2.02. In the combined model, the results were that adolescents 14 or 15 years old making up 49.3% of the population had the highest risk of binge drinking; OR = 3.184. The results of this study could be used to promote positive social change by highlighting more efficient intervention programs to prevent adolescents from binge drinking and could also enable county and state Public Health officials to design programs to properly allocate resources based on evidence and need, especially in racially diverse communities.

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Dedication

I would like to dedicate this dissertation to my family and friendly friends. This has been a very long and demanding journey and I could not have finished this without their support through this entire process. I would like to dedicate this dissertation to my parents who taught me that tough times don't last but tough people do last.

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I would like to acknowledge Dr. Peter B. Anderson, who was my committee chair, and whose tremendous support and guidance through this process made it a lot easier than I could imagine. I would also like to thank Dr. John Oswald, who served on my committee for his input and guidance. Finishing this dissertation is a dream come true.

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Chapter 1: Introduction to the Study

Introduction

Alcohol is the most used substance among America's youths (Harding et al., 2016). Underage drinking continues to be a major problem in the United States (Harding et al., 2016) and the rest of the world such that it is the world's third largest risk factor of disease and contributes 4% of the world disease burden (Marshall, 2014). Worldwide, approximately 2.5 million deaths each year are directly related to alcohol, with 9% of these from adolescents and young adults within the ages of 15 to 29 years (Marshall, 2014). In the United States, 43,000 deaths a year result from binge drinking in youths, and binge drinking cost the U.S. economy $24 billion in 2010 (Centers for Disease Control and Prevention [CDC], 2016; Xuan, Nelson, Heeren, Oussayef et al., 2015a). The impact of binge drinking starts from the adolescents themselves and extends to their families, communities, and society as a whole (Harding et al., 2016). Some have considered underage drinking a social behavioral problem that relies on the social experiences in the person's life such as stress and psychological distress (Liu, Keyes & Li, 2014; Woo, Wang, & Tran, 2017). Others have said it is influenced by both genetics and the environment (Doumas & Esp, 2017; White & Hingson, 2014). Regardless of where the triggers of alcohol consumption in youths come from, excessive consumption is a public health concern in the United States (Harding et al., 2016; Sudhinaraset Wigglesworth, & Takeuchi, 2016; Woo et al., 2017). The effects of frequent alcohol consumption in adolescents are associated with dependence, as dependence increases by

4 times for those with an onset before the age of 15 years, thereby increasing related negative consequences (Marshall, 2014). Although adolescents generally drink less often than adults do, when they drink, they usually do so in large quantities within a couple of hours (Reeb et al., 2015; Xuan et al., 2015a). Some of the detrimental effects of adolescent alcohol consumption include shrinking of the brain, leading to mental health and neuro-cognitive issues that are most likely to continue to adulthood, liver disease, abuse of other drugs, accidental injuries, and death (Acosta, Hospital, Graziano, Morris, & Wagner, 2015; CDC, 2016; Marshall, 2014; Stickley et al., 2013; Sudhinaraset et al., 2016; Woo et al., 2017).

The legal age of drinking in the United States is 21 years (CDC, 2016). However, underage drinking in the United States is very common (Paschall, Lipperman-Kreda, & Grube, 2013). Youths between the ages of 12 to 20 years are responsible for 11% of total alcohol consumed, and most of this (90%) is consumed via binge drinking (Maryland Youth Risk Behavior Survey [MDYRBS], 2013). The Youth Risk Behavior Survey 2013 report for the entire United States showed that during a 30-day look back period, 35% of high school students drank some alcohol, 21% were engaged in binge drinking, and 10% were involved in driving after consuming alcohol while 22% were given rides by their peers who had been drinking (MDYRBS, 2013). The 2013 MDYRBS report indicated that 60.9% of youths drank some alcohol, 19.3% had a drink before the age of 13, and within a 30-day look back period, 31.2% consumed alcohol and 17% were involved in binge drinking.

The problem with early onset of alcohol consumption and excessive drinking lies in its negative consequences (Patrick & Schulenberg, 2014; Xuan et al., 2015b). One thousand eight hundred twenty five college students between the ages of 18 and 24 die each year from unintended alcohol related injuries, and more than 690,000 are assaulted by another student who has been drinking (Hingson, Zha, & Weitzman, 2009). Earlier onset of alcohol consumption is more likely to progress into dependence than for those youths who start at the later age of 20 or older (Porche, Fortuna, Wachholtz & Stone, 2015; Wellman, Contreras, Dugas, O'Loughlin, & O'Loughlin, 2014). Binge drinking being the most common form of drinking in underage youths increases rapidly with age such that the proportion (1 in 3 youths) at age 13 who drink will report becoming binge drinkers in a 30-day look back period, and the proportion will increase to half by age 15 (Harding et al., 2016).

Youth alcohol consumption is the main cause of health and social problems in youths (CDC, 2016; Xuan et al., 2015b). An estimated 2 in 3 youths who drink participate in binge drinking, which is defined as having five or more drinks in a row (CDC, 2015). The consequences of binge drinking are severe, including alcohol poisoning, physical injuries, and neurological damage, and these youths are also more likely to consume other illegal products and drugs such as tobacco and marijuana (CDC, 2016; MDYRBS, 2013).

Conducting this study in Montgomery County Maryland was relevant to examine the impact of racial diversity on the risk factors for binge drinking, in an effort to

accurately identify adolescents at risk and design efficient early intervention programs. This study may enable Montgomery County and the State of Maryland to properly allocate resources based on evidence and need. Being able to statistically identify factors influencing youth alcohol consumption for this sample population could lead to improved health in later years, improved school attendance, and higher grades, leading to more graduations and higher standards of living; it could also lead to reduced alcohol related accidents, injury, and death, improved health, and reduced rates of violence. I employed a quantitative approach to examine adolescents and their association between suicidality, being bullied, substance use, and protective factors (adolescents having parents, teachers or school personnel, or other adults to seek help or advice from as well as just to discuss their problems or concerns with) and binge drinking. The social ecological model was the theoretical foundation used for this dissertation. Data analyzed were obtained from the Maryland youth tobacco risk behavior survey (MDYTRBS), 2014, and Montgomery County Maryland was of interest because of its ethnic diversity and population. In summary, this chapter contains a background of the study followed by problem statement, purpose, research questions that guided the study as well as theoretical framework, assumptions, limitations, and the significance of this dissertation to the community and other stakeholders.

Background

Chronic diseases are the leading causes of death worldwide, representing 60% of all deaths (World Health Organization [WHO], 2017). Out of an estimated number of 35

million deaths in 2006 from chronic diseases, half were under the age of 70 years, and half were women (WHO, 2017). In the United States, 7 out of the 10 leading causes of death are from chronic diseases, and two of these chronic diseases, heart disease and cancer, are responsible for nearly 48% of all deaths (CDC, 2016). The onset of most chronic diseases is the result of unhealthy choices, leading to health risk behaviors like lack of physical activity, poor nutrition, tobacco, and excessive alcohol consumption (CDC, 2016). In 2006, the economic cost of excessive drinking was $223.5 billion, most of which was due to binge drinking and resulted in loss of hours from work, health care cost, and crimes (CDC, 2016).

Excessive alcohol consumption in the United States is a concern present in both adults and adolescents. The impact of binge drinking is not only a threat to the physical and mental state of the adolescent but also puts them at risk for unintended injuries, alcohol poisoning, and alcohol use disorders (Wellman et al., 2014). The constitution as amended in 1919 prohibited the sales of any intoxicating drinks to youths (National Institute on Alcohol Abuse and Alcoholism [NIAAA], 2017). Today, most states have rules that prohibit alcohol consumption until age 21, and the federal government encourages the states to do so. In addition to the minimum age laws, some states have additional laws to reduce underage drinking like laws against falsifying identification when purchasing alcohol or minimum age to be bar tenders (NIAAA, 2017). The acting U.S. surgeon general 2007 in collaboration with the National Institute on Alcohol Abuse and Alcoholism and Substance Abuse and Mental Health Services Administration

identified several goals for government, parents, other adults, educators, and youths to promote healthy lifestyles in youths (NIAAA, 2017). One of such goals is the need for more understanding on adolescent drinking across various environmental, ethnic, and cultural backgrounds (NIAAA, 2017). More recently, in November 2016, a report from the current U.S. surgeon general identified substance use disorder as one of America's most pressing public health concern (NIAAA, 2017). The surgeon general's report of November 2016 further illustrates with scientific evidence that adolescence is a high risk period, and adolescent alcohol use has detrimental effects on the young brain still undergoing maturation.

Over the years, these attempts in reducing adolescent alcohol intoxication have made progress as there has not only been a decline in underage drinking in the United States but age at first consumption of alcohol consumption has increased from 13.65 years in 1991 to 1993 to 14.47 years in 2011 to 2013 (Chen, Yi, & Faden, 2015; MDYTRBS, 2014). However, due to the continued high rates of prevalence in underage drinking and its negative consequences, it continues to be a major public health concern in the United States (Harding et al., 2016; Marshall, 2014). Researchers have identified that even though adolescents may not consume alcohol as often as adults, when they do, it is often through binge drinking (Reeb et al., 2015; Xuan et al., 2015b). Patrick and Schulenberg (2014) and Xuan et al. (2015b) have examined risk factors for youth alcohol abuse. While no researcher has been able to comprehensively analyze all risk factors for excessive alcohol consumption, some have looked at a broad range of factors

(see Nelson, Van Ryzin, & Dishion, 2015; Patrick & Schulenberg, 2014; Patrick et al., 2013; Xuan et al., 2015a). Most importantly, these studies have mostly been done at a national level with fewer studies done on smaller populations, and limited studies have been conducted in very diverse ethnic populations like Montgomery County, Maryland. Examining the risk factors of binge drinking in Montgomery County, Maryland with a different demography from the entire United States helped fill the gap of limited research in this population and may help uncover new risk factors or under looked factors that may be responsible for youth binge drinking for this population. This is beneficial for health promotion initiatives as more efficient intervention programs can be identified and implemented. It could also be beneficial to parents and family members of adolescents, educators, law makers who could more properly allocate resources based on evidence as well as the entire community as a whole.

Problem Statement

Underage drinking is on an increase in Montgomery County, Maryland (kicks, 2016). While there has been no significant change in the percentage of high school youths who consumed five or more drinks in a row between 2005 and 2013, there has been a slight increase for the percentage of females who had one or more drinks within the past month (MDYTRBS, 2014). The MDYTRBS (2014) report indicated that more females (29.1%) than males (23.0) consumed alcohol within the past 30 days in 2014. Studies have indicated that early consumption of alcohol increases the risk of binge drinking in older youths (Marshall, 2014; Reeb et al., 2015; Xuan et al., 2015b).

Both in Montgomery County, Maryland and nationally, underage binge drinking continues to be a significant social and health issue, with statistics for the United States indicating that 90% of youth alcohol consumption occurs during excessive alcohol consumption and binge drinking (Foster, Hicks, Iacono, & McGue, 2014; Paschall et al., 2013; Patrick et al., 2013). While prior researchers have focused on a national platform with limited ethnic diversity, several scholars have indicated the need for more research to be done on populations with more diverse race (Reeb et al., 2015; Salas-Wright, Hernandez, Maynard, Saltzman, & Vaughn, 2014). Data from the MDYTRBS (2015) may fill the gap in the limited research in this geographic region and uncover new or understudied antecedents of youth binge drinking in the more racially diverse communities like Montgomery County in Maryland. Identifying these risk factors is a necessary first step towards mitigating them in an effort to promote community health in racially and ethnically diverse communities. The risk factors may be mitigated through the development of efficient protective measures against early and excessive alcohol consumption.

Previous studies have linked early binge drinking to bullying, suicidality, and substance abuse (Haberstick,Young, Zeiger, Lessem, Hewitt, & Hopfer , 2014; Leeman, Hoff, Krishnan-Sarin, Patock-Peckham, & Potenza, 2014; Paschall et al., 2013; Snyder & Rubenstein, 2014; Wilkinson, Halpern, Herring, Shanahan, Ennett, Hussey, and Harris, 2016) et al.,). Patrick et al. (2013) investigated the association between binge drinking and social life, educational success, religiosity, and population density. These studies

have largely been conducted at a national level where racial and ethnic diversity is less important than in some local communities and regions with great diversity like in Montgomery County, Maryland. The United States Department of Health and Human Services (2017) revealed in 2014 nationwide population data that the adolescent distribution was 54.1% White, 14.0% Black, and 22.8% Hispanic. The MDYTRBS (2014) specified that adolescents in high schools distribution for Montgomery County, Maryland were 32.6% White, 22.3% Black, and 26.6% Hispanic. Of significance is an estimated 10% difference in population between Blacks and Whites in Montgomery County while that of the entire United States has almost 4 times as many Whites than Blacks. Similarly, the difference between White and Hispanic in Montgomery County is estimated at 6% while nationally there are twice as many Whites as Hispanics. Montgomery County is the most populated county in Maryland with a projected 2020 population of over 1 million, and it is also one of the most diverse counties in the state with four of its cities being in the top 10 diverse cities in the United States; furthermore, it is among the top 20 diverse counties in the entire United States (Sederholm, 2016; United States Census Bureau, 2016).

This research helped fill the gap in the limited studies on more diverse racial populations or subpopulations from that of the United States as a whole, which has been the focus of prior researchers. Amongst the recommendations for future research, Patrick et al. (2013) identified the need to study the behavioral predictors and risk factors of binge drinking on populations other than 12th graders across the nation. This dissertation

fills the gap by studying ninth through 12th graders. I analyzed predictors and risk factors in a significantly more diverse demographic population to determine if the same antecedents exist or not, the influence of racial diversity, if any, all of which are beneficial to public health promotion programs, the local communities, the state, and nation as a whole.

Purpose

Prior research has been done on the risk factors of alcohol consumption at the societal and individual levels, but not enough has been done looking into the subgroups with very diverse races (Sudhinaraset et al., 2016). Culture is a determining factor that molds the stressors and coping mechanisms that affect binge drinking in adolescents (Woo et al., 2017). Race is a significant construct in cultural diversity (Omi & Winant, 2014). With this region being demographically diverse compared to the rest of the United States, I examined if antecedents of binge drinking as identified by other researchers on a nationwide population are applicable to this subgroup of the population with a different demography. This research may also help uncover new or understudied antecedents of youth binge drinking in more racially diverse populations. Hence, the purpose of this quantitative dissertation was to examine the predictors of binge drinking in high school youths in Montgomery County, Maryland. This dissertation involved testing the statistical significance of the influence of being bullied, suicidality, protective factors (adolescents having parents, teachers or school personnel, or other adults to seek help or advice from as well as just to discuss their problems or concerns with) and substance use

on binge drinking in Montgomery County, Maryland youths, as well as predicting which independent variable, if any, has a higher statistical significance. To obtain these results, a binary logistic regression model was used to determine the association between suicidality, being bullied, substance use, protective factors (independent variables), and binge drinking (dependent variable).

Research Questions

Research Question (RQ) 1: What is the association between being bullied and binge drinking among high school youths in Montgomery County, Maryland controlling for age, gender, and race?

$H_{\mathbf{01}}$: There is no association between being bullied and binge drinking among high school youths in Montgomery County Maryland controlling for age, gender, and race.

H_{a1}: There is an association between being bullied and binge drinking among high school youths in Montgomery County, Maryland controlling for age, gender, and race.

RQ2: What is the association between suicidality and binge drinking among high school youths in Montgomery County, Maryland controlling for age, gender, and race?

H_{02}: There is no association between suicidality and binge drinking among high school youths in Montgomery County, Maryland controlling for age, gender, and race.

H_{a2}: There is an association between suicidality and binge drinking among high school youths in Montgomery County, Maryland controlling for age, gender, and race.

RQ3: What is the association between substance use and binge drinking among high school youths in Montgomery County, Maryland controlling for age, gender, and race?

H_{03}: There is no association between substance use and binge drinking among high school youths in Montgomery County, Maryland controlling for age, gender, and race.

H_{a3}: There is an association between substance use and binge drinking among high school youths in Montgomery County, Maryland controlling for age, gender, and race.

RQ4: What is the association between having an adult other than a parent to seek help from (protective factors) and binge drinking among high school youths in Montgomery County, Maryland controlling for age, gender, and race?

H_{04}: There is no association between having an adult other than a parent to seek help from (protective factors) and binge drinking among high school youths in Montgomery County, Maryland controlling for age, gender, and race.

H_{a4}: There is an association between having an adult other than a parent to seek help from (protective factors) and binge drinking among high school youths in Montgomery County, Maryland controlling for age, gender, and race.

RQ5: What is the association between being bullied, suicidality, substance use, and in having an adult other than a parent to seek help from (protective factors) and binge

drinking among high school youths in Montgomery County, Maryland controlling for age, gender, and race?

H_{05}: There is no association between being bullied, suicidality, substance use, and in having an adult other than a parent to seek help from (protective factors) and binge drinking among high school youths in Montgomery County, Maryland controlling for age, gender, and race.

H_{a5}: There is an association between being bullied, suicidality, substance use, and in having an adult other than a parent to seek help from (protective factors) and binge drinking in high school youths in Montgomery County, Maryland controlling for age, gender, and race.

Framework

The social ecological model (SEM) was the theoretical framework used for this study. This was the most appropriate model for this study because it is used to consider both personal and contextual factors that influence behavior (see Golden & Earp, 2012). Connell, Gilreath, Aklin, and Brex (2010), in their study of influences on substance use in nonmetropolitan high school students, used the SEM due to the multifaceted nature of adolescent alcohol consumption. The SEM was also significant to this study because researchers can use it to bring awareness of individual factors that may influence binge drinking in adolescents and also other factors as being part of a larger sphere of influence with multiple levels that are interactive and reinforcing with one another (see Stokols, 1996). Stokols (1996) also mentioned that because targeting all levels of influence in an

intervention may be impossible, health promotion programs should aim to include at least two levels of influence.

The SEM was originally developed by Brofenbrenner in 1979 as ecological systems theory and has since been further developed by other scholars, lastly Stokols in 1992 and 2003, to what is known as the SEM (Glanz, Rimer, & Viswanath, 2008). This model is based on the contention that behavior is the result of various individual, interpersonal, organizational, community, and public policy factors that are all interdependent. Figure 1 illustrates the different levels of influence.

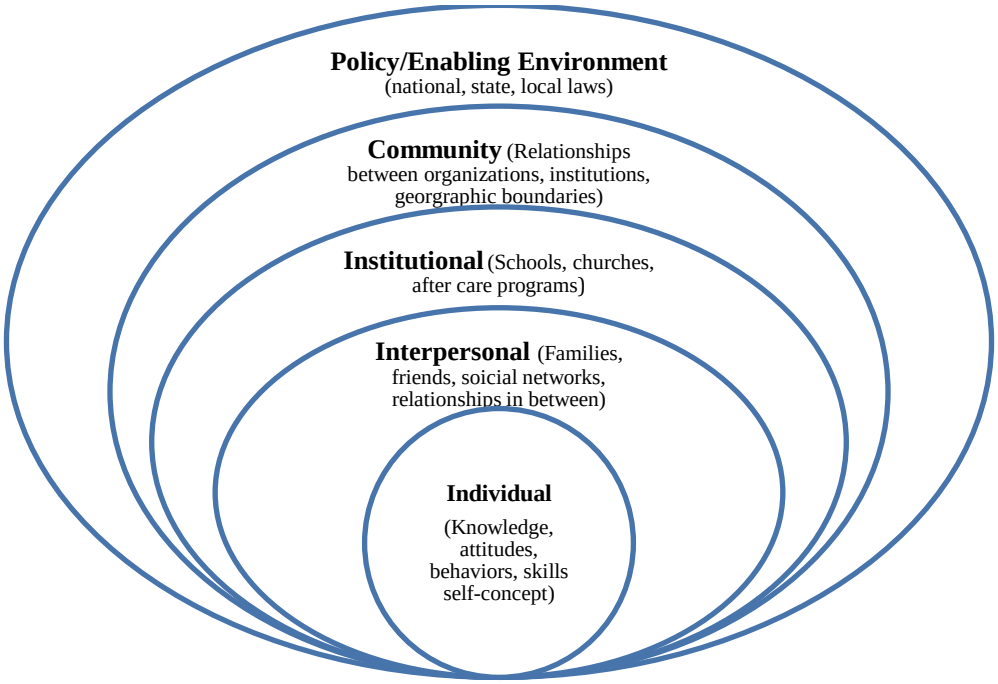

Figure 1. The socioecological model.

Adapted from: McLeroy, K. R., Bibeau, D., Steckler, A., & Glanz, K. (1988). An ecological perspective on health promotion programs. *Health Education & Behavior*, *15*(4), 351-377. And

Centers for Disease Control and Prevention (CDC, 2014), The Social Ecological Model: A Framework for Prevention, http://www.cdc.gov/violenceprevention/

The individual level consists of personal factors that may or may not facilitate binge drinking in adolescents such as knowledge, age, gender, behavior, personal values, beliefs, and skills (Connell et al., 2010; McLeroy, Bibeau, Steckler, & Glanz, 1988). Generally, males have been seen to consume more than females nationally even though the gap reduces as adolescents get older and in older adults over the age of 30 years (Connell et al., 2010; Haberstick et al., 2014; Khan et al., 2013; Pedersen, 2013). Intrapersonal factors like depressive symptoms, behavioral problems, and low grade point are likely to be seen in adolescents with substance misuse problems and have equally consistently been attributed to initiation and frequency of use (Bachman, Staff, O'Malley, & Freedman-Doan, 2013; Donath et al., 2012; Tomek et al., 2015).

The next level is the interpersonal level, which deals with culture of the community, formal and informal social networks, and support systems including relationships such as those with family members, friends, and teachers (Golden and Earp, 2012; McLeroy et al., 1988). Both family and social influences are the most studied in terms of adolescent and binge drinking (Connell et al., 2010). The culture of a community influences adolescents' exposure to alcohol. In some communities, the strength of a man is seen in the amount of alcohol he can consume in one seating (Iwamoto & Smiler, 2013). Masculine norms challenges often encourage excessive alcohol use, but more research is needed on masculine norms in adolescents (Iwamoto &

Smiler 2013). Such behaviors increase the disposition of adolescents towards alcohol consumption. Peer behavior and perceptions toward alcohol abuse is a very significant risk factor in adolescent consumption (Connell et al., 2010; Jacobs, Barry, Xu, & Valente, 2016; Schwinn & Schinke, 2014). In addition, peer disapproval is significant in adolescent behavior towards consumption. In Dinges and Oetting (1993), 90% of adolescents involved in substance use, report having peers who are also involved in substance use. Similarly, some parents exercise more parental control than others, and if an adolescent is in the mist of parents or parental figures who discipline adolescents, they are less likely to abuse alcohol or be involved in deviant behaviors since parental discipline acts as a buffer between peers' and siblings' alcohol use (Donovan, 2016; Patrick & Schulenberg, 2014; Shakya, Christakis & Fowler, 2012). Parental attitude towards alcohol may also be a risk factor to adolescent behavior towards alcohol, depending on what the attitude is because they are role models to adolescents (Jacobs et al., 2016; Schwinn & Schinke, 2014). Thus, the culture of the community, support systems, and relationships can influence excessive alcohol consumption positively or negatively.

The third level is institutional and examines how society through institutions helps in molding an atmosphere that supports or discourage binge drinking (McLeroy et al., 1988). Adolescents spend most of their active day in institutions with organizational characteristics like schools and after care programs; hence, the structures and processes of these organizations may have an effect positively (protective factor) or negatively

(increasing risk) on the attitude and behavior of the adolescents towards alcohol (McLeroy et al., 1988). Institutions provide a forum where several adolescents can be reached at the same time to deliver health promotion benefits against alcohol consumption (McLeroy et al., 1988). On the other hand, it could also act as a forum through which peers influence other adolescents to engage in deviant behaviors like binge drinking.

The fourth level consists of communities referring to relationships among organizations, institutions (churches, schools), as well as defined boundaries of where these formal and informal networks occur like cities, towns, and states (Golden and Earp, 2012; McLeroy et al., 1988). It is in these communities that relationships that foster or discourage binge drinking between adolescents take place, such as schools and neighborhoods. Research has shown that there is a strong influence between community and adolescent alcohol consumption (Connell et al., 2010). If adolescents perceive their environment as being disorganized with high rates of alcohol consumption and high availability, the risk increases, and the reverse is true (Connell et al., 2010).

Last is policy level, and involves local, state, and national laws and policies. Alcohol policies constitute laws, regulations, and practices put in place to decrease excessive alcohol consumption and its unwanted consequences (Xuan et al., 2015a). Examining the individual and interpersonal levels of influence as well as the antecedents of youth binge drinking in a diverse population of Montgomery County, Maryland may

provide a better understanding of consumption patterns, thus enabling more efficient intervention programs.

Nature of the Study

A quantitative approach was selected for the study because this approach more effectively identified an association or statistical significance between the various factors that may influence binge drinking in Montgomery County, Maryland youths. A similar approach was used in a study by Arterberry, Smith, Martens, Cadigan, and Murphy (2014) in which they examined the association between protective strategies and alcohol on 363 students who reported binge drinking. In another study by Sangalang, Tran, Ayers, and Marsiglia (2016), a quantitative approach using logistic regression was used to determine the association between being a bully, being bullied, and being both a bully and victim and risk for substance use in youths with a Mexican heritage. Through a multivariate logistic regression Patrick et al., (2013) were able to determine the prevalence and predictors of extreme binge drinking in 12th grade students.

In this dissertation, I used secondary data collected via cross-sectional design. Data were obtained via self-administered questionnaires administered to a representative sample of students in Grades nine through 12 in public and private schools in Montgomery County using a two-stage cluster design. The 2014 MDYTRBS questionnaire had 99 questions, including 89 in the standard questionnaire. Data were cleaned to avoid inconsistencies, and incomplete questionnaires that failed quality control check were removed. Weighting was also applied based on gender, race/ethnicity, and

grade to each record to adjust for nonresponse and oversampling of Black and Hispanic students in the sample. A binary logistic regression was used to examine the association between the outcome variable (binge drinking) and the independent variables, which are suicidality, being bullied, substance use, and protective factors. Binge drinking was identified as the number of drinks (five or more) adolescents consumed in a row (MDYRBS, 2014).

According to Jackson et al. (2014), some researchers have argued that alcohol-related concerns begin with very low levels of drinking as low as two drinks in a row while others like Wechsler, Dowdall, Davenport, and Rimm (1995) have stated five drinks for males and four drinks for females as more appropriate. However, for this dissertation, five or more drinks were used for both male and female adolescents (see MDYRBS, 2014). Suicide is the third leading cause of death in adolescents (Wong, Zhou, Goebert, & Hishinuma, 2013).

Suicide ideation, suicide attempts, and suicide completion have all been linked to alcohol consumption in adolescents, and the difference in this relationship may be linked to demography (Tomek et al., 2015). For the purposes of this study, suicidality was the variable analyzed and was on adolescents who had seriously considered attempting suicide and adolescents who made plans to commit suicide within a 12 month look back period.

Bullying is a phenomenon that exists in adolescents in all parts of the world (Durand et al., 2013). While different definitions of bullying exist, researchers have

agreed that bullying should involve aggression with the aim to cause harm to the victim, involve repetition over time, and the bully in some way has strength and or social power over the victim. Bullying could be physical, verbal, or relational (Hertz, Everett Jones, Barrios, David-Ferdon, & Holt, 2015). For this dissertation, the different types were not differentiated in the analysis.

Substance use increases in adolescents 12 to 19 years old and is usually associated with negative outcomes (Wilkinson et al., 2016). Researchers have shown that early substance use is related to substance use related problems later in life (Nelson et al, 2015). Approximately one third of high school students in the United States report using marijuana, which is also one of the most used substances by adolescents. A 30day look back period of marijuana was used for this dissertation and a life time use of synthetic marijuana was used (MDYTRBS, 2014).

Protective factors are factors that aid in guiding youths away from deviant and risk behaviors and towards healthy behaviors (MDYTRBS, 2014). These factors represent structures that youths have within their families, schools, and communities (MDYTRBS, 2014). For this dissertation, protective factors referred to adolescents having parents, teachers or school personnel, or other adults to seek help or advice from as well as just to discuss their problems or concerns with (see MDYTRBS, 2014). A lack of protective factors implies risk to binge drinking in adolescents.

Sources of Information

The 2015 Youth Risk Behavior Surveillance System (YRBSS) was the source of data. Through the CDC, the Division of Adolescent and School Health fund the states and local agencies to collect this data biennially. The data contained survey questions on risky behaviors. The primary reason for this data collection by the CDC was to determine the prevalence of health–risk behaviors, assess their trends, and examine their co-occurrence so as to enable better health policies for states, school districts, and territories.

Definitions

The dependent variable for this research was binge drinking, and the independent variables were being bullied, suicidality, substance use, and protective factors. Definitions of these variables are examined below.

Being bullied: This was measured by questioning adolescents if they had been bullied on school property within a 12 month period (MDYTRBS, 2014, Question 22).

Binge drinking: This was measured by questioning adolescents on how many days during the past 30 days, did they have 5 or more drinks of alcohol in a row, within a couple of hours? (MDYTRBS, 2014, Question 48).

Protective factors: This was measured by questioning adolescents if they had an adult other than their parent to talk to about what was important to them, and if they had a teacher or an adult at school to talk to about any private matter concerning them. (MDYTRBS, 2014, Question 96 and MDYTRBS, 2014, Question 97 respectively)

Substance use: This was measure was obtained by asking adolescents about how many times in their life time marijuana has been uses (MDYTRBS, 2014, Question 26), and their life time use of synthetic marijuana (also called K2, Spice, fake weed, king kong, yucatan fire, skunk, or moon rocks)"? (MDYTRBS, 2014, Question 58).

Suicidality: This was measured by questioning adolescents about attitude towards considering attempting suicide within a 12 month period (MDYTRBS, 2014, Question 25) and if a plan had been made about how suicide would be attempted (MDYTRBS, 2014, Question 26).

Assumptions

I assumed that participants were truthful in their responses to survey questions. I also assumed that participants were able to recall correctly how many drinks they drank in a single setting within a 30 day look back period. In addition, I assumed that participants remembered correctly and were truthful about their responses related to marijuana, being bullied, and suicidality. These responses were critical to this research study because they aided in determining the relationship of the adolescents and binge drinking.

Scope and Delimitation

This study was a quantitative study using secondary data from the YRBS administered by the state of Maryland's Department of Health and Mental Hygiene in fall 2014. The CDC sponsors this data collection through states, and it is a representative sample of ninth through 12^{th} grade students in both public and private schools. Data are

collected every 2 years (odd year), usually during the spring semester, but in Maryland, it was done in the fall of every even year, starting in 2014, and data are made available in the following odd year with other the data collected for the rest of the nation. A three-stage cluster sample design was used to obtain the sample of participants of all public, catholic, and private school students. A weighting factor was also used, which enabled data to be used as a representative sample for current students only since it did not involve youths out of school. The SEM was used as the theoretical foundation for this study and controlled variables were age, gender, and race. The health belief model was identified but not used because adolescent behavior towards alcohol is complex, involving both personal factors and environmental factors, and the SEM is more comprehensive as it covers all factors including policy which to an extent affects adolescent binge drinking.

Limitations

This study is limited in several ways, including the fact that data were self-reported and adolescents may not properly recall their drinking habits. Similarly, questions on being bullied and suicidality were asked for over a 12-month period and may be subjected to recall bias. Lifetime questions were asked on substance use, which may not also be properly recalled. A threat to validity may have been introduced as adolescents may not properly recall the number of drinks they had for binge drinking qualifications. Adolescents may have also consciously reported false drinking amounts due to fear even though they were made aware of the confidentiality of their answers.

This study was limited to questions on the survey, implying that not all the levels of the ecological model could be fully addressed.

Significance

This was a cross-sectional retrospective survey study of factors, which influence binge drinking in racially diverse Montgomery County youths. Setting this study in Montgomery County, Maryland was relevant in examining the impact of racial diversity on the risk factors of binge drinking in an effort to accurately identify adolescents at risk and design efficient early intervention programs for this community. This study may enable Montgomery County and the state of Maryland to properly allocate resources based on evidence and need. These social and behavioral problems continue through adolescence and lead to alcohol dependence, more absenteeism from school and work, and higher risks of taking other drugs (Office of Juvenile Justice and Delinquency Prevention, 2012). Increased dependence in adult hood leads to higher risks of poor health, including liver inflammation, damaged heart, disrupted communication in the brain, and higher risks of certain cancers (NIAAA, n.d.). Understanding the risk factors for Maryland youths could lead to the development of intervention programs, including policies enforcing the legal age of alcohol consumption as well as reducing the adverse effects on Maryland youths who are engaged in binge drinking. Being able to statistically identify factors influencing youth alcohol consumption could lead to improved health in later years, improved school attendance, and higher grades leading to more graduations and higher standards of living; it could also lead to reduced alcohol related accidents,

injury, and death, improved health, and reduced rates of violence (Office of Juvenile Justice and Delinquency Prevention, 2012).

The results of this study could also be significant to the stakeholders at the local community levels. Providing information not only as to the prevalence of risk factors but also risks based on ethnicities could allow the local communities to examine how some of these risk factors by ethnicities could be effectively and efficiently mitigated. For example, the communities could limit the distribution of alcohol by restricting alcohol outlet and hours of sale within the communities, which have been shown to influence consumption, especially in minority neighborhoods (Freisthler, Lipperman-Kreda, Bersamin, & Gruenewald, 2014; Sudhinaraset et al., 2016). The culture of these communities could be reexamined by the communities themselves, thereby providing better intervention programs. Organizations could benefit as institutions with structures and processes that have a high prevalence of risk factors could be redefined, and because adolescents spend a good portion of their day in these institutions, interventions could be applied at greater scales and with more ease than in environments in which schedules will have to be made and at smaller scales.

Summary

Adolescent binge drinking is both universal and local in the United States. The prevalence is high, with 43,000 deaths a year related to binge drinking (CDC, 2016). The health effects of excessive alcohol consumption in adolescents ranges from unintended injuries to liver disease, missed classes, and shrinking of the brain, leading to mental

health and neuro-cognitive issues, and the effects continue beyond the adolescents to their family members and friends. The influences on adolescent alcohol consumption are complex, ranging from personal (genetic) factors to environmental factors. In this study, I aimed to identify the association between these factors (suicidality, being bullied, substance use, and protective factors) and binge drinking. The SEM as enhanced by Stokols in 1992 was used because it is a model that is multifaceted with several levels of influence. This is necessary for the state of Maryland since it has a more diverse population than the entire United States, for which most research has been done. The findings of this research could be beneficial to health promotion workers, families, and public policy makers. In Chapter 2, I examine related peer reviewed journals on antecedents of binge drinking in adolescents as well as more on the SEM.

Chapter 2: Literature Review

Introduction

The aim of this study was to examine the association between binge drinking and antecedent risk factors among adolescents in Montgomery County, Maryland. Underage drinking continues to be a problem in the United States (Harding et al., 2016) with 43,000 deaths a year resulting from binge drinking in youths and costing the U.S. economy $24 billion in 2010 (CDC, 2016; Xuan et al., 2015b). Youths between the ages of 12 to 20 years are responsible for 11% of total alcohol consumed, and most of the alcohol (90%) is consumed via binge drinking (MDYTRBS, 2013). Researchers who have examined risk factors antecedent to binge drinking have focused on a national platform. This literature review provides an insight on the risk factors for binge drinking in Montgomery County, Maryland. Chapter 2 comprises of the literature search strategy and literature review of published articles containing various risk factors related to binge drinking in adolescents, the conceptual framework, and a summary of the chapter.

Literature Search Strategy

I conducted research for articles searching the various databases available through Walden's Library and other related sites. Some of the databases used to search for articles included ScienceDirect, CINAHL Plus with Full Text, PubMed, Google Scholar, and Thoreau Multi-Database Search. The search terms included *adolescent binge drinking, predictors of binge drinking in adolescents, prevalence of binge drinking in youths, bullying and binge drinking in youths, substance use and binge drinking in adolescents,*

protective factors and binge drinking in adolescents, risk factors for binge drinking in youths, multilevel approach to adolescent binge drinking, socio-ecological model, and *binge drinking*. I reviewed over 200 articles written between 2011 and 2017, with the majority being less than 5 years old.

Theoretical Foundation

The SEM was the theory used for this dissertation. No one theory or model fully explains the ecology of alcohol or substance abuse because of the complexity of understanding the pattern of alcohol misuse and substance use, and how this pattern of behavior is influenced by individual (genetic) and environmental factors (Bogg & Finn, 2009). However, some models have provided valuable insight into this ecology, including the SEM. Brofenbrenner originally developed the SEM in 1979 as an ecological systems theory. Since then, Brofenbrenner and Stokols have further refined and renamed the concept, creating the SEM (Glanz et al., 2008). The SEM is based on the contention that behavior is the result of the interaction of individual and environmental factors and the influence of organizational and policy factors (McLeroy et al., 1998). The ecological model consists of five levels: individual, interpersonal, organizational/institutional, community, and public policy (McLeroy et al., 1998).

The individual level of the SEM involves personal factors, or individual characteristics of the adolescent that may or may not facilitate binge drinking in adolescents, such as knowledge, attitudes, skills, and gender (McLeroy et al., 1998). For this sample population, examples of such individuality that may predict misuse of alcohol

may be seen in antisocial behaviors, poor impulse control, high sensation-seeking, lack of self-control, anxiety, and depressive symptoms (Doumas & Esp, 2017; NIAA, 2017). Connell et al. (2010) found that individual factors influence substance use. Within the female population, most adolescent females described their alcohol use as experimental while within the male population, most adolescent males engaged in alcohol consumption, but they described their use as occasional use (Connel et al., 2010).

The interpersonal level is the second level, which consists of close relationships, formal and informal social networks, support systems, and friendships that may influence binge drinking (McLeroy et al., 1998). The interpersonal level for the study of risk factors of binge drinking in adolescents consisted of relationships with friends and types of friends, relationships with family members, parents or parental figures, and poor parenting skills, all of which have been shown to have an impact on adolescent behavior and binge drinking (Jacobs et al., 2016; Kao, Lupiya, & Clemen-Stone, 2014; Patrick & Schulenberg, 2014; Schwinn & Schinke, 2014; Stickley et al., 2013). Deviant peers in friendship circles, easy access to alcohol, and parents who misuse alcohol may all increase the risk of binge drinking in adolescents (Shakya et al., 2012). Relationship problems such as bullying or being bullied by peers also influence adolescent binge drinking (Bradshaw, Waasdorp, Goldweber, & Johnson, 2013; Durand et al., 2013).

The third level, the social institutional level or organizational level, is characterized by formal and informal rules and regulations that if absent will enhance the presence of deviant behaviors and truancy. Adolescents spend over one third of their lives

in institutions such as schools and after care programs, where most relationships, norms, and attitudes are built (McLeroy et al., 1998). The third level includes a test of the effect of unstructured social institutions and formal or informal communities, programs, and organizations on binge drinking in youths. Some examples include schools, after school activities, rules and regulations in neighborhoods, and recreational opportunities that if absent will encourage the deviant behaviors and truancy that are characteristic of adolescents involved in binge drinking. Through these organizations, communities can start implementing and institutionalizing programs that would reduce risk factors. Therefore, a lack of these organizations can create communities with increased risk factors for adolescent binge drinking (McLeroy et al., 1998).

The fourth level of the SEM is the community level.This community level expands the organizational /institutional level by dealing with the relationships between organizations in geographical locations (McLeroy et al., 1998). The impact of the community on risk factors of binge drinking in adolescents may be seen in the characteristics of the neighborhood and availability of alcohol outlets (Sudhinaraset et al., 2016). Bernstein, Galea, Ahern, Tracy, and Vlahov (2007) studied the relationship between the neighborhood environment and alcohol consumption and found that poor neighborhoods with marginal amenities had a significantly higher prevalence of binge drinking than richer neighborhoods. The higher presence of liquor stores in minority communities may explain increased consumption in these communities due to easier access to alcohol (Freisthler et al., 2014). Gruenewald, Remer, and LaScala (2014) also

found that greater outlet densities were associated with the frequency and amount of drinking.

The fifth level is the policy level, which deals with national, state, and local policies or public laws that may discourage binge drinking in adolescents. The absence of these laws creates an environment that increases risk of underage drinking in adolescents (McLeroy et al., 1998). The policy level includes societal factors such as educational, health economics regulated by laws, and policies and procedures that protect the adolescents. Historically, the use of protective policies has affected the public health of the nation (Frieden, 2015). Xuan et al. (2013) found that tax policies that affect the purchase of alcohol by adults (making alcohol more expensive) influenced binge drinking in adolescents. The absence of these policies could be associated with risk factors for binge drinking in underage drinkers. In this dissertation, the intrapersonal and interpersonal levels were tested.

Study Variables

Suicidality

Suicide is the 10th leading cause of death in the United States with approximately 105 people dying from suicide every day (Caetano et al., 2015; Glasheen, Pemberton, Lipari, Copello, & Mattson, 2015). Suicide is the third leading cause of death in adolescents (Wong et al., 2013). Depression and substance use, specifically of alcohol, have been strongly associated with suicidality (Wong et al., 2013). Suicidality is associated with the tendency of ending one's life, and if very severe, may result in

excessive drinking to deal with this psychological discomfort (Gonzalez & Hewell, 2012). Researchers have indicated that there is a close link between depression, depressive symptoms, and suicidality (Miller et al., 2017). For this reason, my reviews include those on depression and depressive symptoms. Alcohol consumption including binge drinking may be the outcome of suicidality, depression, and depressive symptoms; hence, the literature reviewed includes these symptoms.

McManama, Becker, Spirito, Simon, and Prinstein, (2014) studied the association between depressed mood, suicidality, and alcohol in hospitalized adolescents. Adolescents with severe depression have increased alcohol consumption compared to those without any depression (Kim, Han, Trksak & Lee, 2014; Parshley, 2013; Snyder & Rubenstein, 2014). The frequency of alcohol consumption increased in those with increased odds of suicide attempt, indicating that alcohol may be used as a coping mechanism in those who are suicidal and have poor coping mechanisms (McManama et al., 2014). McManama et al., (2014) recommended future research on a different population sample from adolescents currently hospitalized. This dissertation furthers the knowledge on antecedents of adolescent binge drinking by investigating the association between suicidality, substance use, protective factors, being bullied, and binge drinking in Montgomery County high school youths. This dissertation may also extend scientific knowledge in this field by investigating this association in a sample population of more than 108 hospitalized adolescents, such that findings could have more validity for this population, and be applicable to similar populations.

Wilkinson et al., (2016) investigated the association between depressive symptoms and substance use (alcohol and marijuana) in adolescents. Depressive symptoms and substance use are common in adolescents, and symptoms tend to increase with the increased age of the adolescent. Both are usually present in adolescents, and some researchers have theorized that depression leads to substance use, while those using the stress model hypothesize that substance use predicts depression via interfering with parent/care giver relationships as well as peer relationships (Wilkinson et al., 2016). Wilkinson et al., (2016) investigated if depressive symptoms predicted substance use in adolescents based on self-medication and Wilkinson et al.'s findings indicated that, in both binge drinking and marijuana use, the prevalence increased with increasing age: between the ages of 14 to 16, 25% engaged in binge drinking; 55% between the ages of 20 to 22years, and then starts declining (38%) as they became young adults between the ages of 32 and 34 years. This trend has been supported by other studies by Durand et al. (2013), and Doumas and Esp (2017). However, Snyder and Rubenstein (2014) indicated that depression increased the risk of alcohol consumption/binge drinking in emerging young adults. While Wilkinson et al.'s 2016 study is limited because of the sample selection (African Americans); this dissertation will investigate a sample population with high ethnic heterogeneity allowing the results to be more generalized to similar populations.

Gonzalez and Hewell (2012) examined the association between suicidality and drinking to cope among young adults who were defined as those between the ages of 18

to 25 years. Suicidality sometimes involves alcohol as a coping mechanism towards their suicide ideation [SI] (Gonzalez & Hewell, 2012). Drinking to cope (DTC) is a significant outcome in suicide ideation even when controlling for depression (Gonzalez & Hewell, 2012). Gonzalez and Hewell (2012) hypothesized that there is an association between SI and DTC. After accounting for negative urgency, low negative mood regulation expectances (NMRE), and avoidant coping skills, Gonzalez and Howell (2012) found that suicidal ideation was significantly associated with DTC. However, when NMRE and negative urgency were controlled for, the association between suicidal ideation and DTC was weakened (Gonzalez and Howell, 2012). Suicidality results in excessive drinking to deal with this psychological discomfort experienced by those who are suicidal (Gonzalez and Hewell, 2012). Parshly, (2013), has seen similar results of a strong association between suicidality, and DTC in undergraduate students. While Gonzalez and Hewell, (2012) add to the scientific knowledge on suicidality, and DTC on young adults, the sample population is limited as it involved students within a specified college, and the sample size was small with 109 students. My dissertation may provide more insight in this research area as my sample size will be larger and broader with sample selection involving a broader geographic area, and a three-stage sample cluster design indicating that my findings could be generalized to similar samples especially those within the state of Maryland.

Another study that examined suicidality and alcohol consumption is that of Tomek et al. (2015). The authors examined the association between suicidality and

frequent alcohol use in Black American adolescents. Tomek et al., (2015) studied risk factors relating to SI and suicide attempts (SA) in adolescents between the age of 11-18 years and examined race/ethnicity, gender, socioeconomic status, and metal health conditions. Alcohol use was associated with suicidality over time, and the risk of suicidality increased with increasing age (Tomek et al., 2015). Although several studies including that of seminal review have proposed that being Black may be a protective factor for suicide (Evans, 2014; Wang, Lightsey Tran, & Bonaparte, 2013), few studies have actually examined the problem using a racially diverse population (Tomek et al.,2015). SI and SA in adolescents is complex, and though prevalence has been linked to demographic and cultural factors, cross-sectional studies in African American adolescents is limited (Wilkinson et al., 2016). This dissertation aimed to fill the gap by investigating the association between suicidality and binge drinking in a racially diverse population that may support the hypothetical associations between alcohol and suicide risk that could underpin the need for resources targeting early identification of risk factors. In addition, Tomek at al., (2015) examined an adolescent sample in which there was at least one SI reported so results could not be easily generalized to the entire population limiting its applicability. This dissertation used a random sample with a three-stage cluster design such that statistical findings could be more generalized in similar populations.

The variable suicidality is associated with the tendency of ending one's life and severe tendencies may lead to excessive drinking to deal with the psychological

discomfort (Gonzalez and Hewell, 2012). Studies examined under this variable have predominantly used samples with limited generalizability as seen in the study by McManama et al., (2014) which examined the association between depressed mood, suicidality and alcohol consumption in hospitalized adolescents; Wilkinson et al., (2016) investigated the association between depressive symptoms and substance use (alcohol and marijuana) in African American adolescents; Gonzalez and Hewell (2012) examined the association between suicidality and drinking to cope among young adults within a specified college with a small sample size of 109 students; and Tomek et al. (2015), examined the association between suicidality and frequent alcohol use in Black American adolescents. My dissertation fills the gap in these studies by examining a more diverse population and also a non-institutionalized sample as well as a larger sample, which increases applicability.

Protective Factors

Alcohol consumption in high school youths is a predictor of heavy drinking in both college and non college youths (Wellman et al., 2014). Wellman et al., (2014) suggested those protective behavioral strategies (PBS), which are strategies that change how adolescents drink; for example staying away from drinking challenges, avoiding mixing different types of alcohol, and not trying to out-drink peers may be most beneficial in influencing impulse drinking. In addition, the authors maintained that using specific PBS in conjunction with personality-targeted interventions might also be beneficial in reducing harmful impulse drinking (Wellman et al., 2014). As high rates of

underage drinking in the United States continue to be of major concern, researchers are focused on identifying new or previously overlooked factors that may help deter underage drinking. Research has shown that lack of these PBS increases the risk of binge drinking, substance use, and other deviant behaviors in adolescents (Grazioli, Lewis, Garberson, Fossos-Wong, Lee, & Larimer, 2015). Researchers have more often looked at protective behavioral strategies that may be more easily addressed in intervention programs rather than on general protective factors such as race/ethnicity and parental upbringing. However, protective factors such as having a parent or parental figures tend to be more influential on adolescent attitudes towards alcohol consumption (Stone, Becker, Huber, & Catalano, 2012). I examined Protective behavioral strategies (PBS) in this study because they all fall under the protective factors, and individual characteristics as seen on the first level of the socioecological model. A lack of PBS may mean increased risk of excessive alcohol consumption or binge drinking. The Maryland Department of Health and Mental Hygiene (2014) described protective factors as those factors that deter youths from unhealthy behaviors, including support from parents or parental figures in adolescents' life as well as participating in extracurricular activities. This review examined several studies that analyze various protective factors against adolescent binge drinking indicating that the absence of these factors implied increased risk to binge drink (Jacobs et al., 2016; Schwinn & Schinke, 2014).

Doumas and Esp, (2017) examined the effect of behavioral strategies on binge drinking in high-risk adolescents. The authors identified the high risk-taking

characteristic of high school students as a key reason for high alcohol consumption. Their risk-taking tendency Doumas and Esp (2017) argued, is due to significant structural and functional changes taking place in adolescent brains at this time which influences behavior (Doumas and Esp, 2017). Although the link between the brain and human behavior is complex, certain regions of the brain, including the region for pleasure and reward seeking, mature faster than parts responsible for decision making and impulse inhibition (Doumas and Esp, 2017). In addition, dopamine transmission is different in adolescents, leading to heightened activation and reduced inhibition in response to rewarding stimuli. Heightened impulsivity and high sensation seeking in the mid to late teens translates to higher risk in alcohol consumption and binge drinking (Doumas & Esp, 2017). Researchers have examined protective factors in an effort to reduce the risks associated with excessive alcohol consumption. Protective behavioral strategies shield adolescents from excessive alcohol use, thereby buffering them from its negative consequences. Doumas and Esp, (2017) studied the ability of PBS to mediate the relationship between impulsive sensation seeking and binge drinking, and related consequences. Doumas and Esp (2017) hypothesized that adolescents with high impulsive sensation seeking and with multiple PBS would have reduced rates of binge drinking compared to those with fewer PBS.

Doumas and Esp, (2017) found impulsive sensation- seeking significantly predicted binge drinking and alcohol related consequences, a finding previously reported by MacPherson, Magidson, Reynolds, Kahler, and Lejuez (2010). In addition, students

who performed PBS consumed fewer drinks and had fewer alcohol-related consequences than their peers who did not use PBS. This result is consistent with the findings by D'Lima, Pearson, and Kelley (2012) who reported that because PBS regulated consumption of alcohol, using the strategies therefore acted as a buffer against negative alcohol consequences associated with high impulsive sensation-seeking. A limitation of Doumas and Esp, (2017) study is the mostly White adolescent sample which restricts generalization. My dissertation sample consisted of a more racially diverse population. In addition, the sample had fewer high-risk participants because it required parental consent for which response is usually harder to get for adolescents involved in high alcohol consumption (Doumas & Esp, 2017). In this dissertation study, even though parental consent is part of the process of data collection, other non-related alcohol questions are present in the survey such as nutrition, physical activity, safe driving practices which may make parents more likely to return consent forms (MDYTRBS, 2014).

Liu, Keyes, and Li (2014) examined how work stress on adolescents may influence alcohol consumption, and how family and peer can moderate work stress influences. I would categorize family and peer influences under interpersonal factors on the SEM. Just being in the work place or the perception of being in the work place may introduce work stress. For example, an adolescent simply thinking that he or she has to put in very long hours of work is by itself stressful even before they start doing the actual work. Adolescent academic expectations, and relationships with parents and peers affect work stress and alcohol consumption. Adolescents who engage in more than 15 hours of

work per week outside of school are more likely to have poorer grades than those who do not (Bachman et al., 2013). Poorer grades facilitate lack of interest in academics and allow for deviant behaviors (Liu et al., 2014). Additionally, parental and peer use of alcohol is a strong predictor of adolescent alcohol consumption (Schwinn & Schinke, 2014). This observation also implies that peer and parent relationships may moderate work stress, and therefore affect alcohol consumption (Liu et al., 2014). Liu et al., (2014) examined the association between peer and parental relationships and alcohol consumption in their study, and found that academic ambition was inversely related to excessive alcohol consumption while work stress and peer influences were directly related to alcohol consumption even after controls were added. In relation to the SEM, work stress is an individual factor while peer influences would be interpersonal characteristics. Bachman et al., (2013) obtained similar results with adolescents who experienced work stresses and were more likely to be engaged in problematic alcohol consumption.

Liu et al., (2014), recommend future studies examine individual characteristics of adolescents, and the effect of social support be incorporated to improve understanding. This dissertation may add more knowledge in the field as recommended by Liu et al., (2014) by examining not only individual characteristics of adolescents like ethnicity but also the different age groups which is a limitation in Liu et al.'s study since they only look at one particular age or school grade (grade 12). In addition, a national platform

used in Liu et al.'s (2014) study, may mask antecedents of binge drinking that may be seen in racially diverse communities.

Schwinn and Schinke (2014) studied risk factors of alcohol use in adolescent urban youths, concentrating on peer and parental influences; which in this dissertation would be a lack of protective factors and tested at the interpersonal level of the SEM. Schwinn and Schinke (2014) argued that peers and parental influences greatly influence the consumption patterns of drinking in youths. Peers are particularly influential at this stage in life because peer interaction is at its peak, while parental interaction is decreasing due to adolescents' attempts at autonomy (Schulenberg, Patrick, Maslowsky, & Maggs, 2014). Consequently, peers become role models to other peers, exert pressure and provide opportunities for their peers to use alcohol, as seen in etiology theories of youth substance use (Schulenberg et al., 2014). Using hierarchical modelling, Schwinn and Schinke 2014 found that there was a correlation between increased binge drinking in adolescents and increased peer alcohol consumption and peer alcohol offers in a one-month period. Similarly, parental influence through rules against alcohol use lead to decrease in last month's use but the percentage of decrease was smaller in relation to decrease in peer consumption and peer alcohol offers. A limitation of this study is that most of the adolescents were from economically disadvantaged families and most of them were African Americans. This dissertation extended knowledge through this limitation by examining an ethnically heterogenic population.

Jacobs et al. (2016) examined the association between family structure, parent and sibling alcohol use, perceived peer norms toward consumption, and alcohol use in a sample of adolescents in the United States. Jacobs et al., (2016) found an association between the ease at which adolescents obtained alcohol and increased alcohol consumption in Hispanic or Latino adolescents. According to Jacobs et al., (2016), most of the adolescents indicated they had difficulty accessing alcohol at home. However, most of them reported alcohol use, suggesting that alcohol was obtained by other means, and indicating the need for more stringent controls on alcohol access, especially in social gatherings (Jacobs et al., 2016). Parental and sibling use appeared to facilitate adolescent use, because these family members served as role models or increased access (Jacobs et al., 2016). Jacobs et al., 2016 found no association between family structure and alcohol use; having a single parent or both parents present was not a risk factor. The risk factors Jacobs et al. (2016) found, were the consumption pattern of parents and adolescents' perceptions of peer attitudes towards alcohol consumption. In alignment with prior studies which have found a strong peer influence on adolescent alcohol consumption (Schwinn et al., 2014), the Jacobs at al. (2016) study found that adolescents who perceived that they would be rejected by their friends if they consumed alcohol were less likely to consume alcohol. Similarly, adolescents who perceived their friends as consuming more alcohol were more likely to consume alcohol. Based on the findings of Jacobs et al., 2016, Hispanic/Latino adolescents have an increased risk of alcohol consumption compared to adolescents of other races. The authors also stated that given

the detrimental consequences of alcohol consumption, it is imperative that interventions for alcohol consumption in this sample population prevail. A limitation in Jacobs et al., (2016) study is that the participants were mostly Hispanic/Latino, and participants were 10^{th} graders. This dissertation fills the gap by using a more diverse sample and examining adolescents in different grades to provide results that may reveal overlooked antecedents of binge drinking. It may also produce results that could be generalized in similar populations and in addition provide more insight since adolescents in different grades participated in the study.

As indicated by the studies in this section, the absence of protective factors may lead to the onset alcohol consumption in adolescents. Studies reviewed in this section concentrated on various factors linked to protective factors as in the study by Doumas and Esp (2017), which examined behavioral strategies while Liu et al., (2014) examined the moderated effects of family and peer influences on work stress on adolescents; Schwinn and Schinke (2014) examined the direct influence of peer and family on adolescent alcohol consumption and Jacobs et al., (2016) examined the association between family structure, parent and sibling alcohol use, perceived peer norms toward consumption, and alcohol use in a sample of adolescents. A major limitation in these studies was in their sample selection which has made it difficult for their studies to be generalized as seen in Jacobs et al., (2016), Doumas and Esp, (2017) and Schwinn and Schinke (2014). Liu et al., (2014) used a national platform, which may mask antecedents of adolescent binge drinking. My dissertation fills the gap in these studies by using a

sample, which covers the entire adolescent age group (Grades 9 through 12), a higher level of ethnic heterogeneity and a sample design, which allows results to be generally applicable in other similar populations.

Substance Use

Leeman et al. (2014) investigated the extent of the association between the following: one, sensation- seeking, substance use (frequent alcohol consumption, binge drinking, marijuana and cigarette) and gambling; two, impulsivity, substance use, and gambling; and third, the strength of the relationships in adolescents who work less than full time jobs. They demonstrated a correlation between difficulties with self-control, sensation seeking, impulsivity and risky behaviors including binge drinking in adolescents. Using regression models, impulsivity, sensation-seeking and having a part-time job were significantly associated with frequent alcohol use and binge drinking. Leeman et al., (2014) is significant to this dissertation study which will examine the association between substance use and binge drinking in adolescents because Leeman et al. (2014) have shown not only that the association exists, but that it is mediated in adolescents by high impulsivity and sensation seeking. Leeman et al. (2014) used logistic regression to determine that less than full time employment for adolescents, impulsivity, and sensation seeking were risk factors strongly related to binge drinking.

When all the variables are in one model, only frequency of alcohol use was significant, implying that the age of first use or early drinking is a predictor of binge drinking (Leeman et al., 2014). Additionally, having a part time job had the tendency to

increase impulsivity and sensation- seeking, two factors shown to increase alcohol and substance use. Liu et al. (2014) found similar results with part time jobs increasing substance use in adolescents. Leeman et al, (2014) tested the interrelationships between sensation seeking and gambling; impulsivity, substance use and gambling; and how these association will be stronger in adolescents having part time jobs. However, the results do not clearly provide the association between alcohol consumption, binge drinking and cigarette or marijuana use in adolescents even though it established the association between sensation seeking, impulsivity and substance use. This dissertation may provide more knowledge on the association between marijuana use and binge drinking in adolescents. It may also uncover antecedents that may have been overlooked or masked in the data used which represents a national platform, since data used for this dissertation will be racially diversified.

Haberstick et al., (2014), examined the association of alcohol and marijuana use disorder as well as gender differences in the onset of the alcohol and marijuana dependence. Some of the most prevalent psychiatric disorders are alcohol and substance use disorders, which are also directly, associated with societal and economic costs with outcomes such as low socioeconomic status and poorer health conditions (Haberstick et al., 2014; McCabe, West, Schepis, & Teter, 2015). Haberstick et al., (2014) using data from wave IV of the National Longitudinal Study of Adolescent Health, did a multivariate logistic regression analysis to determine period of risks and onset of dependence in adolescents. Alcohol and marijuana abuse were found to be prevalent and

more prevalent in males than in females, in line with other studies by Khan et al. (2013) and Lev-Ran, Le Strat, Imtiaz, Rehm and Le Foll (2013). In addition, onset for marijuana dependence was earlier than that of alcohol. While this study adds significant information to the field, a national platform was used to analyze the data, which may mask other associations present within the adolescent population in Maryland. This dissertation aimed at filling this gap.

Yap, Reavley, and Jorm (2012) examined youth's beliefs about the negative consequences of alcohol, cannabis, and tobacco. Their research is significant to this dissertation because beliefs represent attitudes, and attitudes influence behavior. Alcohol consumption and substance use in youths are associated with higher risks of various mental disorders later on in life, and this is a dose response relationship (Yap et al. 2012). Vignettes were used to ask survey questions on depression, depression with suicidal thoughts, psychosis, depression with alcohol abuse, or post-traumatic stress disorder and depicted youths of 15to17 years, 21 years, and 18to25 years. Seventy five percent of the youths thought it was not acceptable for the youths in the vignettes to consume alcohol, marijuana, and tobacco for relaxation, and over 78% agreed that cutting down the amount consumed would be beneficial. In addition, 76% agreed that reducing the amounts of marijuana and alcohol would reduce the risk of associated health problems, but only about half of the population agreed that staying away from sweets or surgery foods would be significant. While females were more likely to reject some beliefs about substance use, other participants were less likely to believe in the harmfulness of marijuana and

cigarettes when used as relaxants. Most of the participants in the Yap et al., (2012), study believed in the negative consequences of consuming alcohol and other substances. Males had favorable attitudes regarding substance use than females, and hence, were less likely to endorse all beliefs on substance use in the vignettes (Yap et al., 2012). This is consistent with findings by Haberstick et al. (2014), who indicated that substance use is more prevalent in males than in females.

Shakya, et al., (2012) examined the significance of parental upbringing on substance use, which included alcohol, smoking, marijuana, and binge drinking. Their research is significant to this dissertation in that the association between substance use and binge drinking was examined, as well as protective factors (parental or adult figure available for adolescents to have important interactions with). Activities of social networks may influence substance use of members within that network, and interpersonal relationships within that network may play a role in substance use within the network (Shakya, et al., 2012). Shakya et al., (2012) obtained data from the National Longitudinal Study of Adolescent Health which contained answers on questionnaires about adolescent substance use, adolescent behavior, friends' behavior in social networks, and method of parenting. Each student named five female and five male friends identified in the school system and used to complete the social network of schools. The researchers found that friends with similar behavior characteristics tended to be in the same social networks, and adolescents with parents who participated fully in their overall activities were less likely

to engage in substance use; so too were their friends. For adolescents with authoritative parents, their risk of binge drinking greatly reduced, by 57%.

The parents' behavior towards substance use is very influential in the behavior of the adolescence, not just the authoritative parenting styles. Being a friend of an adolescent whose mother has good parenting skills influences the behavior of the adolescent either through the friend or through direct contact with the mother (Shakya et al., 2012). The results are consistent with several studies, which have indicated that peer influence in substance use is very strong (Danielsson et al., 2011; Dugas et al., 2014; Patrick et al., 2014). Lastly, the parent may also act as a parent to an adolescent's friend when circumstances present themselves. This positive relationship with a friend's parent has a favorable outcome on mentoring in adolescents (Patrick, et al., 2014; Shakya et al., 2012). Shakya et al.'s, (2012) study is of great significance to this dissertation research since the research covers risk factors of binge drinking in adolescents and one of these risk factors is substance use (marijuana use). However, Shakya et al., (2012) uses a national platform, which may mask other antecedents or associations relating to binge drinking in adolescents. This dissertation uses a racially diversified population, which may uncover these antecedents.

Nelson et al. (2015) studied the pathways of individual patterns on alcohol, marijuana, and tobacco from early adolescence (11 years) to young adults (24 years) and how these pathways facilitated the identification of risk factors through which adolescents and young adults became involved with or avoid substance use. Nelson et

al.'s research is significant to this dissertation because onsets are possibly identified through pathways and risk factors through onsets. Nelson et al. determined that the trajectory for alcohol use for both high school students and recent graduates from high school was similar to that of marijuana. For participants who had an early onset for both marijuana and alcohol, risk of abuse increased when usage also increased.

According to Nelson et al. (2015), participants who began substance use in high school and increased their usage in marijuana and alcohol were more likely to experience problematic levels in young adulthood and beyond than those who began early but did not increase usage. In addition, trajectories towards abuse of all substances increase significantly for males out of school. For alcohol users only, one trajectory declined. This was because of the onset of the consequences of alcohol (Nelson et al., 2015). In general, there was an overlap between trajectories, indicating that there is a link between uses of substances (Nelson et al., 2015). An adolescent identified with more than one pathway was at a higher risk of involvement with other substances when older (Nelson et al., 2015). Poor self-control by adolescents is also a contributor to initiation into substance use. Identification of the risk factors at different age groups (middle school, high school, and post high school) may help determine who is greatest at risk and at what period (Nelson et al., 2015). Nelson et al. contributed greatly to the field by not only examining the trajectory of adolescent binge drinking and substance use but also of multiple substances and the effects of early onset on later adolescence. However, Nelson et al. examined substance use only and no other risk factors. In this dissertation, I aimed

at filling the gap by looking at other risk factors of adolescent binge drinking, including substance use.

Alcohol and marijuana are not only the most used substance in adolescents but also account for the most common disorders and are responsible for high economic costs including reduced productivity at work and morbidity (Haberstick et al., 2014). Studies reviewed in this section used marijuana, alcohol and tobacco as substance use. These studies even though investigated different aspects in substance use: Leeman et al. (2014) investigated the extent of the associations between sensation- seeking, frequent alcohol consumption, binge drinking, marijuana and cigarette and gambling; impulsivity, substance use, and gambling; and the strength of the associations in adolescents who work less than full time jobs; Haberstick et al., (2014) examined the association of alcohol and marijuana use disorder as well as gender differences in the onset of the alcohol and marijuana dependence; Yap et al., (2012) examined youth's beliefs about the negative consequences of alcohol, cannabis, and tobacco; Shakya et al., (2012) examined the significance of parental upbringing on substance use, which included alcohol, smoking, marijuana, and binge drinking; Nelson et al., (2015) studied the pathways of individual patterns on alcohol, marijuana, and tobacco from early adolescence (11 years) to young adults (24 years) and how these pathways facilitated the identification of risk factors through which adolescents and young adults became involved with or avoid substance use; they all use a national platform which may mask antecedents of binge drinking in adolescents due to a White majority of the population. This dissertation by

using a racially diverse sample may fill in the gap by identifying overlooked or understudied risk factors. In addition, the results of the study by Leeman et al., (2014) do not clearly provide the associations between alcohol consumption, binge drinking and cigarette or marijuana use in adolescents even though it established the association between sensation seeking, impulsivity and substance use. This dissertation may provide more knowledge on the association between marijuana use and binge drinking in adolescents.

Being Bullied

Bullying is a repeated unwanted action intended to scare, hurt, subdue or separate the other person (Sangalang et al., 2016). Bullying and substance use prevalence have indicated detrimental effects on adolescents. Research relating to bullies and substance use has shown an association, which has been consistent, but not when it comes to victims of bullying and substance use (Radliff, Wheaton, Robinson, & Morris, 2012). Some researchers have found that victims of bullying and bullies tend to use more substances than peers not involved in bullying, while others have found that amount of use depends on the substance (Radliff et al., 2012). For the purpose of this dissertation, participants are victims of bullying only. However, literature reviewed may involve the victims, perpetrators, and by-standers.

Radliff et al. (2012) examined the association between bullying and substance use in adolescents by age group. Using Chi square test of independence, most of the middle school participants were neither substance users nor bullies. Out of those who

were substance users and bullies, alcohol was most predominantly and frequently consumed, followed by cigarettes and marijuana. Bullies exhibited the highest use of alcohol, cigarettes, and marijuana, followed by bully-victims (those that have experienced being bullied and are bullies themselves) while those who were not involved in bullying had minimal substance use. For those who were only victims and in high school, use of cigarettes was the most predominant, followed by alcohol. Substance use was highest in bullies and bully-victims for both middle and high school adolescents, than in those not involved, as also indicated by Bradshaw et al., (2013). Radliff et al. (2012) found that being a participant in one deviant behavior facilitated engaging in another deviant behavior. Durand et al., (2013) found similar results in their study in which deviant peers attracted other deviant peers. A limitation of this study includes the fact that it generalizability to Maryland is difficult because of sample selection, which represents one Midwestern metropolitan area. This limitation is mitigated in my study by using a different population sample and sampling methods that allow more generalizability to similar populations.

Hertz et al., (2015) examined the association between adolescent who are victims of bullying and the various consequences including substance use relating from this behavior. Their goal was to enrich the limited understanding that existed on the type of bullying victimization (physical and electronic) and associated risk factors. Additionally, Hertz et al., (2015) added to the knowledge of outcomes of bullying by extending their study to include health risk behaviors most often analyzed by other researchers. Bullying

usually does not happen by itself but often in a complex relationship with other risky behaviors and conditions. Using data from YRBS 2011, the authors found out that victims of bullying are associated with current alcohol use. In girls, electronic bullying promoted negative behaviors, including alcohol consumption, than for females who experienced physical bullying. A major limitation of Hertz et al.'s (2015) study is that they use a national platform, which may mask associations between adolescent bullying and binge drinking. Using my population sample, which is more racially diverse, may uncover some of these antecedents.

There is lack of knowledge about ethnic minorities and adolescent bullying and substance use (Sangalang et al., 2016). Sangalang et al. (2016) investigated the nature of bullying, and the association between bullying and substance use (recent alcohol, cigarette and inhalant use) in American youths with Mexican origin. Sangalang et al.'s (2016) data constituted 1,422 eighth grade students from the last wave of a five year study of the effectiveness of intervention programs on substance use. A logistic regression analysis was used to determine the association between bullying and substance use. Forty percent of youths were rarely bullied while 33.6% were bully-victims (those who were perpetrators and victims as well), 3.7% were victims only, 3.5% were bullies only, and 19% were completely uninvolved with bullying. The prevalence of bully-victims and rarely involved youths for this sample was high compared to other studies that had a prevalence of less than 5% (Turner, Finkelhor, Shattuck, Hamby & Mitchell, 2015). A possible reason for this might be that the sample was from urban areas that are

more prone to violence (Bradshaw et al., 2013). Results from Sangalang et al. (2016) also indicated that there was an association between substance use and the different bully behaviors. Bully-victims were more likely to consume alcohol and were at greater risk of consuming any other substance. A limitation of Sangalang et al's (2016) study is that the sample involved only low-income neighborhoods with 26 of 28 schools having a majority of Mexican heritage, which is not very diversified. In addition, only 8th graders were involved in the sample. This dissertation overcame these limitations and filled the gap by having a racially diversified sample and examine ninth through 12th graders.

Durand et al. (2013) investigated the association between bullying and substance use in children and adolescents. Substance use and bullying often co-occur in adolescents and can cause harm to adolescents. Even though there has been a decrease in substance use in the past decade, it is still of concern in the United States (Durand et al., 2013). Bullying, unlike substance use, starts earlier in children and continues through all ages in adolescence while substance use is more prevalent in middle and high school students (Durand et al., 2013,). Bullying can occur in a variety of ways, and this makes its identification and control challenging. Substance use, a result from bullying may be experienced by all involved, with the extent of influence being different between the perpetrator, the bully-victim, the victim and the bystander. The bully-victim most affected than any of the other individuals. The bystanders affected because of their relationship with the victim. The perpetrator at childhood is more vulnerable towards substance use at adolescence (Durand et al., 2013).

Valdebenito, Ttofi, and Eisner (2015) performed a meta-analysis on bully perpetration, bully-victims, and drug use, concentrating on the association among variables and effect size. They found that one of the most prevalent forms of aggression in schools took place via bullying, which could be direct or indirect. A lot of research has been conducted on bullying and continues to be done not only because of the nature of how it happens but also because of the tremendous effect bullying has on the victims immediately and beyond (Machmutow, Perren, Sticca, & Alsaker, 2012; Sticca & Perren, 2013; Völlink, Bolman, Dehue & Jacobs, 2013). The prevalence of substance use varies across bullies and bully-victims. Current research indicates perpetrators tended to be more associated with substance use. Bullies are three times more likely to be involved with drugs than non-bullies are. Bully-victims are two times more likely to be involved with drugs compared to peers who not bullied as confirmed in a study by Bradshaw, Waasdorp, Goldweber and Johnson, (2013). These results are similar to other cross-sectional and longitudinal studies indicating that bullying is a predictor of substance use, as concluded in a meta-analysis study by Ttofi, Farrington, Lösel, Crago, and Theodorakis (2016) who argued that a possible reason for drug/substance use is to cope with the feeling of rejection. Although the study was based on a wider geographic region (industrialized countries) from my dissertation, externalizing problem behaviors such as bullying and substance use is possibly due to the fact that there may be similar underlying causes based on the same theoretical constructs (Ttofi Ttofi, Farrington, and Lösel, 2012). Future research should focus on bully-victims and substance use and this could be

beneficial since bully-victims are the group more at risk and generally face more rejection than bullies (Ttofi, Farrington, Lösel, and Crago, et al., 2016).

Topper, Castellanos-Ryan, Mackie & Conrod, (2011), investigated the association between adolescents who are victims of bullying and alcohol misuse. Measures included bully victimization, which could be verbal, relational, or physical, drinking motives measured using Rutgers alcohol problem index and alcohol use assessed using quantity and frequency. A regression analysis used indicated that there was an association between victimization and victims' engagement in alcohol (quantity and frequency) over a 12-month period. An even stronger association identified between victims of bullying and alcohol related problems (Topper et al., 2011).

Even though victims of bullying at school may not have drank often, but when they did, they did so heavily (binge drinking) to the extent that it put them at risk of other behaviors, such as fighting, that can further put them in harm's way. Topper et al. (2011) also found, that victims of bullying tended to medicate themselves with alcohol as a coping mechanism compared to others within their age group who drank. Adolescents who were victims of bullying exhibited unique drinking patterns that are distinguishable from their regular drinking patterns, since at risk behaviors used as coping mechanisms usually surface within a year of the bullying event. While Topper et al, adds to the knowledge of victims of bullying and substance use, their study did not include all related forms of bully victimization like electronic bullying.

Bullying is a highly prevalent and extensive form of violence found in adolescents of all ages (Sangalang et al., 2016). Various risks and outcomes have been associated with the prevalence of bullying in adolescents. Literatures reviewed have indicated that regardless of the type of bullying or the identifier (perpetrator, bully-victim, victim or the by-stander) there are unwanted outcomes. Literature reviewed for the being bullied variable and its association with adolescent binge drinking, have indicated that there is still a lot that needs to be done, as some of the research have focused on a national platform (Radliff et al., 2012; Hertz et al., 2015), others have examined sample populations that make it difficult for their results to be generalized such as in Valdebenito et al., (2015) and Topper et al., (2011). Sangalang et al., (2016) examined the risk factors of substance use as it relates to bullying in Mexican-American adolescents. Sangalang et al's (2016) study is limited in its applicability as well as the other studies. This dissertation aimed at filling the gap by looking at a more racially diverse sample, which may undercover some antecedents masked by studies using a national platform. The design of data collected for this dissertation also allowed for unlimited generalizability of the data, which may aid in adding scientific knowledge in the field and encourage other researchers to consider other antecedents.

Binge Drinking

Trucco, Colder, Wieczorek, Lengua, & Hawk (2014) examined how parenting and peer delinquency may influence early adolescent alcohol consumption in the context of neighborhoods. The nature of a neighborhood including social cohesion, racial

composition and income may have an impact on the attitudes of the adolescents especially in disadvantaged neighborhoods by providing a medium through which these neighborhoods function. Parenting via parental control and warmth are positive parental attitudes, such that their absence will mean an increased risk of adolescent alcohol consumption. Poor parenting facilitates delinquent behavior since adolescent unsupervised time increases and for adolescents who spend time with other delinquent peers; this may be a primary influence on the onset of substance use (Trucco et al., 2014). Trucco et al., (2014) studied 11to13year olds, including the age at base line, in a three wave longitudinal study with measures being neighborhood disadvantage, neighborhood cohesion, rule breaking, peer delinquency, and alcohol use. Results indicated that the influence of the neighborhood as a risk factor was greater in older adolescents because older adolescents seemed to spend less time with parents at home and more time with peers in the community. At baseline, it was reported that disadvantaged neighborhoods was associated with higher peer delinquency which in turn predicted higher prevalence of rule breaking at wave two, and at wave three predicted subsequent alcohol use. Trucco et al.'s (2014) study is important to this dissertation because it examines parental and peer influence on adolescent alcohol consumption in a specific context (neighborhood) and also it involves the second level of the socioecological model which will be tested in this dissertation. Some limitations in Trucco et al., (2014) include findings not generalizable to other adolescents based on the age group of the sample population. My dissertation extended the knowledge it examined a broader age range of adolescents of ninth to 12th

graders. Trucco et al., (2014) stated limited generalizability of results to other samples with different demographics because their sample characteristic which was from a single county with a majority white population. This dissertation will mitigate that by looking at a sample with more racially diverse population.

Foster and Hicks (2014) examined the predictors and consequences of adolescent onset and persistent course of alcohol abuse and disorder in women. Women have a higher vulnerability to intoxication by alcohol despite the fact that they have lower levels of alcohol consumption than men do (Foster and Hicks, 2014). Examining the risk at adolescence and through adulthood may provide greater understanding of patterns of risk, which are currently unclear because gender differences are sometimes protective factors (Foster and Hicks, 2014). This was a longitudinal study with age at entry 17 and follow ups done at age 20 and 29. Measures of alcohol included age at first consumption of alcohol without parental permission, past-year alcohol consumption quantity and frequency, total number of intoxications and maximum number of drinks consumed in 24 hours. Other variables measured via questionnaires included other substance use, personality, academic and intelligent functioning, parent and family characteristics and peers. Adolescent onset alcohol use was associated with several factors including substance use and peer use at age 17. A persistent level of alcohol use disorder was associated with heavy drinking. Health consequences of alcohol consumption was similar in all age groups and reduced consumption was seen with increasing age probably due to parenthood or overcoming alcohol use disorder symptoms (Foster and Hicks, 2014).

Foster and Hick's (2014) study is significant to this dissertation in that it examines antecedents of alcohol use in adolescents and women but results are limited as only twins participated in the study. This dissertation would be looking both male and female adolescents as well a population rich in ethnic diversity. This may uncover antecedents of binge drinking currently understudied or overlooked.

Patrick et al., (2013) examined the prevalence and predictors of binge drinking among 12th graders from 2005 to 2011, across the United States. Patrick et al. (2013) studied three levels of binge drinking: 15+ drinks, 10+ drinks, 5+drinks and the risk factors of this consumption pattern. A total of 20.2% of the 12th graders had five or more drinks while 10.5% consumed 10 or more drinks, and 5.6% consumed 15+ drinks within a couple of hours in the previous two weeks. For binge drinking of 5+ drinks, White adolescent males with higher socio- economic status tended to drink more than others. Socio-demographic influences were greatest with 5+ and 10+ utilizers while there was not much difference in those who consumed 15+ drinks. Using a chi square test, there was a significant difference by gender, race/ethnicity, literacy level of parents, and density of population in the prevalence of extreme drinking within 10+ and 15+adolescents but not so much in five + adolescents.

Patrick at al., (2013) examined the predictors over time, and found no differences in the association between the predictors and outcomes. Fifteen plus binge drinking was more common with seniors who had missed school days. Adolescent males were more

prone to engaging in all levels of binge drinking than females and White males were more likely to indulge in binge drinking than males of any other race.

In general, over half of those participants in Patrick et al. (2013) who reported 5+ drinks in a row within a two week period, actually had 10+ drinks and over half of the participants who consumed10+ drinks in a row had 15+ drinks within a couple of hours in a two week period. In addition, the prevalence of drinking was higher in rural than urban areas. Predictors of binge drinking, including socio demographic variables, did not change with the different levels of drinking. Patrick et al., (2013) suggested that further studies should include different populations, communities, school and family. My dissertation filled this gap by examining a sample population with high levels of ethnic heterogeneity, similarly, a school-based sample and parental or adult influences are examined through protective factors.

Xuan et al., (2013) examined the association between adult binge drinking levels and adolescent binge drinking levels at the state level and if tax policies played a role in these drinking levels. This study is important to my dissertation because adults (parents) are tested at the interpersonal level of the SEM used in this dissertation. Xual et al., (2013) found that youth alcohol consumption is directly related to adult consumption, which may be influenced by stringent tax policies. Research has indicated that there is a positive association between youths and parental attitude toward alcohol consumption (Xuan et al., 2013). However, very few of these studies have examined state wide population samples, and even fewer studies have examined the association between

alcohol consumption and tax policies. Alcohol-related policies influence alcohol consumption for both youths and adults in that stringent policy deter consumption (Xuan et al., 2013). Analysis showed a statistically significant association between adult binge drinking, and youth alcohol-related behavior for the same state after controlling for covariates. There was no difference in the results when adjusting for taxes and other variables. However, adult binge drinking reduced the significance of youth alcohol consumption when taxes were involved implying that alcohol taxes may influence youth alcohol consumption via influencing adult binge drinking.

Binge drinking refers to adolescents having five or more drinks in a row (CDC, 2015). Studies examined under this variable have contributed to the knowledge in the field of adolescent binge drinking, yet, several limitations have been identified which makes the results limiting in one way or the other. Most of these limitations affect the generalizability of the results; hence, my dissertation aimed at filling some of these gaps as the sample allows generalizability to similar populations in Maryland. Trucco et al., (2014) examined the influence of parenting and peer delinquency on the onset of adolescent alcohol consumption, my dissertation extends this further by looking at a broader range of age of adolescents (ninth graders to 12 graders). Secondly, the authors stated difficulty in generalizing results because of sample limitation, which was from a county with a white majority. This is a limitation also seen in a study by Patrick et al., (2013) and Xuan et al., (2013). Through this dissertation, I attempt to increase knowledge in the field by examining a sample with more racially diverse population. Secondly,

sample design allows for generalizability of results to similar populations. Foster and Hicks (2014) examined the predictors and consequences of adolescent onset and persistent course of alcohol abuse and disorder in women (adolescent females). A limitation to Foster and Hicks (2014) is that only twins participated in the study. This dissertation fills the gap by using both males and females and a sample population with high levels of racial diversity. This may uncover antecedents of binge drinking understudied or overlooked.

Summary and Conclusions

This chapter focused on summarizing and synthesizing literatures relating to risk factors of binge drinking in adolescents. Risk factors of interest were protective factors, suicidality, substance use, being bullied and binge drinking as the outcome. Sources of literature reviewed have been identified as well as examples of key phrases and words used for the search. A theoretical concept (SEM) is used and how it pertains to the risk factors. The significance of this chapter to the research topic is that it presents the argument that adolescent binge drinking is a societal problem and provides evidence that variables selected for the study are identified as relevant by prior researchers. This study could fill the gap in knowledge on the risk factors of adolescent binge drinking within a racially diverse population. This would be beneficial to other communities with similar population characteristics, as results from this study could be applicable in intervention programs and program planning. I used a quantitative approach to test the significance of the variables in this dissertation. I will discuss his approach in detail in the next chapter.

Chapter 3: Research Method

Introduction

Adolescent alcohol consumption continues to be a public health concern because of the negative consequences associated with it (Marshall, 2014). Even though adolescents consume alcohol less frequently than adults do, they often do so through binge drinking (Harding et al., 2016; Marshall, 2014; Reeb et al., 2015; Xuan et al., 2015b ;). Prior research on risk factors of adolescent binge drinking has mostly focused on a national platform (Nelson et al., 2015; Patrick & Schulenberg, 2014; Patrick, et al., 2013). Studying a population with different demographics and ethnicity may reveal understudied or overlooked antecedents of binge drinking in adolescents. The purpose of this study was to investigate the association, if any, between suicidality, being bullied, substance use, protective factors, and binge drinking in adolescents in a local region of high racial diversity: Montgomery County, Maryland. The variables controlled for were age, gender, and race.

The sections of this chapter include a research design and rational for choosing the design. Next is a description of the methodology that I used, including the target population, procedure used in the collection of secondary data as well as sampling method used. In addition, validity and threats to validity are discussed, followed by ethical concerns and how these concerns were addressed.

Research Design and Rationale

The independent variables for this study were suicidality, which is the tendency of an individual to exhibit suicide ideation, suicide attempts, and suicide completion (Tomek et al., 2016). For this dissertation, suicidality refers to adolescents who have seriously considered suicide within a 12 month period and those adolescents who have made plans to commit suicide during the past 12 months (MDYTRBS, 2014). Being bullied is another independent variable, defined as those who have experienced bullying behavior, which are repeated aggressive behaviors intended to terrify, hurt, or separate the person from their peers (Sangalang et al., 2016). For this dissertation, being bullied included those who have been bullied on school property within the past 12 months (MDYTRBS, 2014). Third is substance use, which is adolescents' lifetime consumption of marijuana (MDYTRBS, 2014). Lastly, there are protective factors, which is having and adult other than your parent to seek help from and having a teacher or an adult at school to talk to about any concerns (MDYTRBS, 2014). The dependent variable is binge drinking, which is described as having five or more drinks in a row within a couple of hours within the past 30 days (MDYTRBS, 2014). Covariates controlled for were age, gender, and race.

A quantitative cross-sectional retrospective study design, one in which data are collected at a specific point in time to investigate the association between the putative risk factor(s) and the health outcome(s), was identified for this study (see Aschengrau & Seage, 2013). A cross-sectional design was appropriate for this dissertation because it

allowed for the taking of snap shots of the population at a specific point in time, and analysis from these snap shots are generalizable to similar populations (see Aschengrau & Seage, 2013). Results from data analyzed through a cross-sectional design are useful in the planning and evaluation of public health programs (Brener et al., 2013). A cross-sectional approach was also appropriate for this dissertation because in cross-sectional studies, data from all variables collected at a specific point in time allow the studying of multiple risk factors and outcomes at the same time (see Aschengrau & Seage, 2013).

A quantitative cross-sectional retrospective design was appropriate for the study because data collected via questionnaires allow this method of analysis. Quantitative studies are especially useful in studying associations between variables, and the significance of these associations are measured such that the statistical significance of one independent variable over a dependent variable can be determined (Rudestam & Newton, 2014). A quantitative method was also appropriate for this dissertation because it allowed for numeric description or comparison of associations between variables extrapolated/obtained from data, which was beneficial in determining statistical significance to the outcome variable (in this case, binge drinking; Rudestam & Newton, 2014).

Secondary data were used for this dissertation because secondary data collection may ensure quality of the data since the process is often guided by experts who may be able to eliminate unforeseen circumstances that may reduce the quality of the data collected (Frankfort-Nachmias, Nachmias, & DeWaard, 2015). Secondary data are cost

efficient because costs associated with data collection are incurred by the primary data collectors (Frankfort-Nachmias et al., 2015). In addition, secondary data analysis has helped me in the structuring of research questions since they are limited to the data collected (see Frankfort-Nachmias et al., 2015). Furthermore, it makes it possible for trends to be studied since data may have been collected over time, which is particularly helpful in evidence-based health promotion programs and policy making (Frankfort-Nachmias et al., 2015). Despite the appropriateness of secondary data for this dissertation, it equally had some challenges in that it limited the design of my research questions to the data collected (see Frankfort-Nachmias et al., 2015). In addition, the definition of variables may be different from what I would have originally wanted them to be. For example, binge drinking is defined as five or more drinks for both adolescent boys and girls (MDYRBS, 2014). If I were to collect the data, I would redesign survey questions such that binge drinking is five or more for boys and four or more for girls (see Wechsler et al., 1995).

Methodology

Population

The targeted population for this study was adolescents currently enrolled in public, charter, and vocational high schools, Grades 9 through 12 in Montgomery County, Maryland. The CDC was the overall governing body for the collection of these data and funds data collection, done biennially with each cycle beginning in July of the preceding even-numbered year and continuing until June of the following even-numbered

year (as cited in Brener et al., 2013). However, some states have permission to make some modification in data collection, and the state of Maryland is one of such states that collect data during the fall of the even year, making the data available the following year (the odd year). In 2014, 45,479 adolescents currently enrolled in high schools were sampled in Montgomery County for the YRBS.

Sampling and Sampling Procedures

A representative sample of adolescent students in Montgomery County, Maryland was obtained via a two-stage, cluster-sampling design (Brener et al., 2013). Multistage sampling was appropriate for the collection of data because the population and geographic extent was very large such that random sampling alone was not feasible (Brener et al., 2013). This method was appropriate because it becomes cost effective for very large sets of data and allows for flexibility since random sampling can be done within the groups (clusters) created (Verial, 2017). In the first stage of the sampling process, high schools were selected using probability proportional to enrollment size (18 schools selected), while at the second stage, classes were selected randomly (Brener et al, 2013). To calculate the suggested minimum sample size for my study, G*Power 3.1.9.2 software was used. I ran a priori power calculation for a logistic regression using an illustrated desired statistical power level of 95% with alpha level of 0.05 and an odds ratio of 1.5 (see Faul, Erdfelder, Buchner, & Lang, (2017). The minimum sample size required was 337.

Data Collection and Recruitment

I used secondary data so there was no active participation in recruitment and participation on data collection. However, to be eligible for participation in the YRBS, schools containing Grades nine through 12 were identified and selection was done based on probability proportional to enrollment (see Brener et al., 2013). These schools were public, charter or vocational schools. After identification of schools, systematic equal probability sampling with a random start was used to select classes from each school that was participating in the survey. A random class based on a requirement like English is identified and once identified; a specific period was chosen and adhered to by all classes for that school (see Brener et al., 2013).

Data was publicly available through the CDC website. However, school districts and counties were coded. So I contacted the state of Maryland for Montgomery County data only. The YRBS was chosen as my data source because it addresses the need for data on health-risk behaviors that contribute to causes of morbidity and mortality in adolescents (see Brener, 2013). It has also been collected over time since 1991, and has undergone changes to improve quality of data to address public health planning needs (Brener, 2013). Data was collected by trained personnel and quality control done by both local agencies and CDC.

Operationalization for Each Variable

The independent variables for this study were being bullied, suicidality, substance use, protective factors, and the dependent variable was binge drinking. For the being

bullied variable (independent variable), the questions were: “During the past 12 months, have you ever been bullied on school property?” (Maryland Youth Tobacco and Risk Behavior Survey (MDYTRBS), 2014 question 22)?” For suicidality (independent variable), the questions were: “During the past 12 months, did you ever seriously consider attempting suicide?” (MDYTRBS, 2014, question 25), “During the past 12 months, did you make a plan about how you would attempt suicide”? (MDYTRBS, 2014, question 26), Questions 25 and 26 are all operationalized using dichotomous answers of yes and no.

For substance use (independent variable), the questions were: “During your life, how many times have you used marijuana?” (MDYTRBS, 2014 question 50). “During your life, how many times have you used synthetic marijuana (also called K2, Spice, fake weed, king kong, yucatan fire, skunk, or moon rocks)?” (MDYTRBS, 2014 question 58). The responses to these questions are categorical as there were more than two answer options. For protective factors (independent variable), the questions were: “Besides your parents, how many adults would you feel comfortable seeking help from if you had an important question affecting your life?” (MDYTRBS, 2014 question, 96), “During the past 12months, did you talk to a teacher or other adults in your school about a personal problem you had?” (MDYTRBS, 2014 question, question 97) Question 97 has dichotomous response of yes and no, while question 96 has a categorical response. For the binge drinking variable (dependent variable), the question was: “During the past 30

days, on how many days did you have 5 or more drinks of alcohol in a row, that is within a couple of hours?" (MDYTRBS, 2014, question 48).

Data Analysis Plan

To test the hypothesis for this dissertation, I used IBM SPSS Statistical software, standard version 24.0. I used secondary data so cleaning had already been done. I analyzed only variables pertinent to my research questions. Entries for these variables were completed for them to be analyzed (i.e. records missing data will be excluded from the analyses). The research questions and hypotheses tested were:

RQ1: What is the association between being bullied and binge drinking among high school youths in Montgomery County Maryland controlling for age, gender, and race?

$H_{\mathbf{01}}$: There is no association between being bullied and binge drinking among high school youths in Montgomery County Maryland controlling for age, gender, and race.

H_{a1}: There is an association between being bullied and binge drinking among high school youths in Montgomery County Maryland controlling for age, gender, and race.

RQ2: What is the association between suicidality and binge drinking among high school youths in Montgomery County Maryland controlling for age, gender, and race?

H_{02}: There is no association between suicidality and binge drinking among high school youths in Montgomery County Maryland controlling for age, gender, and race.

H_{a2}: There is an association between suicidality and binge drinking among high school youths in Montgomery County Maryland controlling for age, gender and race.

RQ3: What is the association between substance use and binge drinking among high school youths in Montgomery County Maryland controlling for age, gender and race?

H_{03}: There is no association between substance use and binge drinking among high school youths in Montgomery County Maryland controlling for age, gender and race.

H_{a3}: There is an association between substance use and binge drinking among high school youths in Montgomery County Maryland controlling for age, gender and race.

RQ4: What is the association between having an adult other than your parent to seek help from (protective factors), and binge drinking among high school youths in Montgomery County Maryland controlling for age, gender and race?

H_{04}: There is no association between having an adult other than your parent to seek help from (protective factors) and binge drinking among high school youths in Montgomery County Maryland controlling for age, gender and race.

H_{a4}: There is an association between having an adult other than your parent to seek help from (protective factors) and binge drinking among high school youths in Montgomery County Maryland controlling for age, gender and race.

RQ5: What is the association between being bullied, suicidality, substance use and in having an adult other than your parent to seek help from (protective factors) and binge drinking among high school youths in Montgomery County Maryland controlling for age, gender and race?

H_{05}: There is no association between being bullied, suicidality, substance use and in having an adult other than your parent to seek help from (protective factors) and binge drinking among high school youths in Montgomery County Maryland controlling for age, gender and race.

H_{a5}: There is an association between being bullied, suicidality, substance use and in having an adult other than your parent to seek help from (protective factors) and binge drinking in high school youths in Montgomery County Maryland controlling for age, gender and race.

For my inferential statistics, I used binary logistic regression test to examine the associations between the dependent and independent variables for each research question. I selected this test because of its widely applied use to examine the association between a nominal/categorical dependent variable and one or more independent variables (see Field, 2013). Using SPSS version 24 0 and a sample n = 45,479, the binary logistic regression was used to compute the following analyses; the associations between dependent and independent variables as well as the direction of the association. This was seen in the variables of the equation table and could be described by odds ratio, significance level, wald statistic and beta values. The odds ratio gives the risk estimate of dependent

variable based on the exposure of the independent variable. The significance of the associations between the dependent and independent variables were measured by the significance in the variables of the equation table. The significance must be less than the set critical level of significance (α 0.05) for the association to be significant. The direction of the association was measured by the beta values. The model summary table gives an estimate of the cases (outcome) that were predicted by the independent variable. Two formulas (Cox and Snell and Nagelkerke) were used. The contribution of each of the covariates (age, gender and race) to the association is also explained. In the analysis, the covariates are included among the independent variables so that their likelihood ratio tests and Wald statistics are measured and therefore their effect on the model detected (Field, 2013). I used descriptive statistics, to describe the Demographic characteristics of the adolescents in the study.

Threats to Validity

Internal and external validity are concepts used in evaluating research findings. Internal validity deals with the causal relationship between the independent and dependent variables, while external validity deals with the applicability of the study findings in other studies (see Frankfort-Nachimias and Nachimias, 2008). This is a retrospective cross-sectional secondary data study and so threats to internal validity are limited. To maximize external validity, health educational professionals who deal with data collection are well trained and training is done every year for old staff as well. One of the ways in which external validity is improved upon is by combining very small

classes such that identity is preserved and weighting is also done. Due to the recurrent nature of data collection which has been done over time beginning in 1991 for the state of Maryland, and revisions being made to the entire YRBSS, threats to external validity have also been minimized. Some threats however like honesty in answering questions cannot be guaranteed, but students are educated about the importance of honesty in answering questions like number of drinks within a 30 day period.

Construct validity is the extent to which the YRBS data answers questions for which it was created (Frankfort-Nachimias and Nachimias, 2008). Some Peer reviewed articles including that by Clayton, Lowry, August, and Jones, (2015); Hertz et al., (2015) and Lowry, Dunville, Robin, and Kann, (2017), and have all indicated that the YRBS answers questions about health risk behaviors as intended. Gast, Caravella, Sarvela, and McDermott, (1995) examined construct validity for the YRBSS on alcohol consumption and desirability. Gast et al., (1995) indicated that the frequency of alcohol consumption by youths declined with increasing age. Males drank more than females, and adolescents who were white drank more than any other races indicating that YRBSS is valid in measuring risky behaviors in adolescents.

Ethical Procedures

I used secondary data from the MDYTRBS obtained as part of CDC's YRBS hence there was no direct participation in data collection. However, an application to Walden University Institutional Review Board (IRB) was submitted to grant me permission for the study and my approval number is 11-06-17-0432828. I did not have

access to any personal identifiable information of the participants. The participants were from 18 schools in Montgomery County Maryland from Grades nine through 12. An email authorizing use of data was sent to both CDC and the State of Maryland, which is the gatekeeper for county data. Ethical guidelines set forth by Walden's IRB were adhered to when necessary.

Summary

This chapter identified and described the research design for the study. The methodology and other components of the methodology such as the target population, sampling and sampling procedures, data collection and data analysis were also described. A quantitative approach was used in analyzing secondary data collected in the retrospective cross-sectional design study. Eighteen schools participated in the survey with 45,479 youths participating from these schools. There was limited application of internal validity since it was a retrospective cross-sectional study but measures were taken to improve external validity. Ethical concerns of the study were examined in the chapter. The next is chapter four, which gave detail data analysis and the results of the study.

Chapter 4: Results

Introduction

Most of the studies conducted on antecedents of youth binge drinking have focused on a national platform (Reeb et al., 2015; Salas-Wright et al., 2014). The purpose of this dissertation was to investigate antecedents of binge drinking in a racially diverse population of high school youths in Montgomery County, Maryland. Four research questions guide this study. The fifth research question addressed the combined effects of the other four independent variables. The moderating variables were age, gender, and race. Secondary data were used to conduct this analysis. The research questions and hypothesis that guided this study were as follows:

RQ1: What is the association between being bullied and binge drinking among high school youths in Montgomery County Maryland controlling for age, gender and race?

$H_{\mathbf{01}}$: There is no association between being bullied and binge drinking among high school youths in Montgomery County Maryland controlling for age, gender and race.

H_{a1}: There is an association between being bullied and binge drinking among high school youths in Montgomery County Maryland controlling for age, gender and race.

RQ2: What is the association between suicidality and binge drinking among high school youths in Montgomery County Maryland controlling for age, gender and race?

H_{02}: There is no significant difference between suicidality and binge drinking among Montgomery County Maryland controlling for age, gender and race.

H_{a2}: There is an association between suicidality and binge drinking among high school youths in Montgomery County Maryland controlling age, gender and race.

RQ3: What is the association between substance use and binge drinking among high school youths in Montgomery County Maryland controlling for age, gender and race?

H_{03}: There is no association between substance use and binge drinking among high school youths in Montgomery County Maryland controlling for age, gender and race.

H_{a3}: There is an association between substance use and binge drinking among high school youths in Montgomery County Maryland controlling for age, gender and race.

RQ4: What is the association between having an adult other than your parent to seek help from (protective factors), and binge drinking among high school youths in Montgomery County Maryland controlling for age, gender and race?

H_{04}: There is no association between having an adult other than your parent to seek help from (protective factors) and binge drinking among high school youths in Montgomery County Maryland controlling for age, gender and race.

H_{a4}: There is an association between having an adult other than your parent to seek help from (protective factors) and binge drinking among high school youths in Montgomery County Maryland controlling for age, gender and race.

RQ5: What is the association between being bullied, suicidality, substance use and in having an adult other than your parent to seek help from (protective factors) and binge drinking among high school youths in Montgomery County Maryland controlling for age, gender and race?

H_{05}: There is no association between being bullied, suicidality, substance use and in having an adult other than your parent to seek help from (protective factors) and binge drinking among high school youths in Montgomery County Maryland controlling for age, gender and race.

H_{a5}: There is an association between being bullied, suicidality, substance use and in having an adult other than your parent to seek help from (protective factors) and binge drinking among high school youths in Montgomery County Maryland controlling for age, gender and race.

The study inquiries were addressed based on information available in secondary dataset. The content in Chapter 4 includes the data collection process, the time frame used to collect the data, baseline descriptive demographic characteristics of the selected population sample, the proportional representation of the sample population, and results. The G*Power software was used in estimating the sample size. The statistical analyses of the descriptive and inferential assessments were performed using the IBM SPSS software application. The processes and methodology employed for data collection were previously discussed in Chapter 3.

Data Collection

This is a secondary data study and data were collected in fall of 2014 and made available from the CDC when publishing data for 2015 YRBS (Maryland Department of Health and Mental Hygiene (2016). All 18 schools in Montgomery County that were systematically selected based on enrollment size in Grades nine through 12 participated in the survey.

School Grades

Table 1 shows the frequency distribution of the school grades attended by all the participants: Ninth graders made up 28.8% (12,975) of the total participants, 10th graders were 25.7% (11,575), 11th graders were 23.1% (10383), 12th graders were 22.0% (9895), and 0.4% (183) were ungraded or missing grades.

Table 1.

A Sample of Descriptive Statistics by Grade

		Frequency	Percent	Valid percent	Cumulative percent
Valid	9th grade	12975	28.5	28.8	28.8
	10th grade	11575	25.5	25.7	54.5
	11th grade	10383	22.8	23.1	77.6
	12th grade	9895	21.8	22.0	99.6
	Ungraded or other grade	183	.4	.4	100.0
	Total	45011	99.0	100.0	
Missing	System	468	1.0		
Total		45479	100.0		

Descriptive Statistics of the Covariates or Confounders

Gender

Table 2 below shows the gender distribution proportion. About 48.8% females and 51.2% males participated in the study.

Table 2.

A Sample of Descriptive Statistics by Gender

		Frequency	Percent	Valid percent	Cumulative percent
Valid	Female	22005	48.4	48.8	48.8
	Male	23066	50.7	51.2	100.0
	Total	45072	99.1	100.0	
Missing	System	408	.9		
Total		45479	100.0		

Age

Table 3 and Figure 2 represent the distribution of the participant by age in four categories. Of the participating adolescents, 1.5% were 13 years old or younger, 49.3% were 14 or 15 years old, 44.5% were 16 or17 years old, 4.7% were 18 years old or older, 0.4% are missing data.

Table 3.

A Sample of Descriptive Statistics by Age in Four Categories

		Frequency	*Percent*	*Valid Percent*	*Cumulative Percent*
Valid	13 years old or less	681	1.5	1.5	1.5
	14 or 15 years old	22344	49.1	49.3	50.8
	16 or 17 years old	20163	44.3	44.5	95.3
	18 years old or older	2115	4.7	4.7	100.0
	Total	45303	99.6	100.0	
Missing	System	176	.4		
Total		45479	100.0		

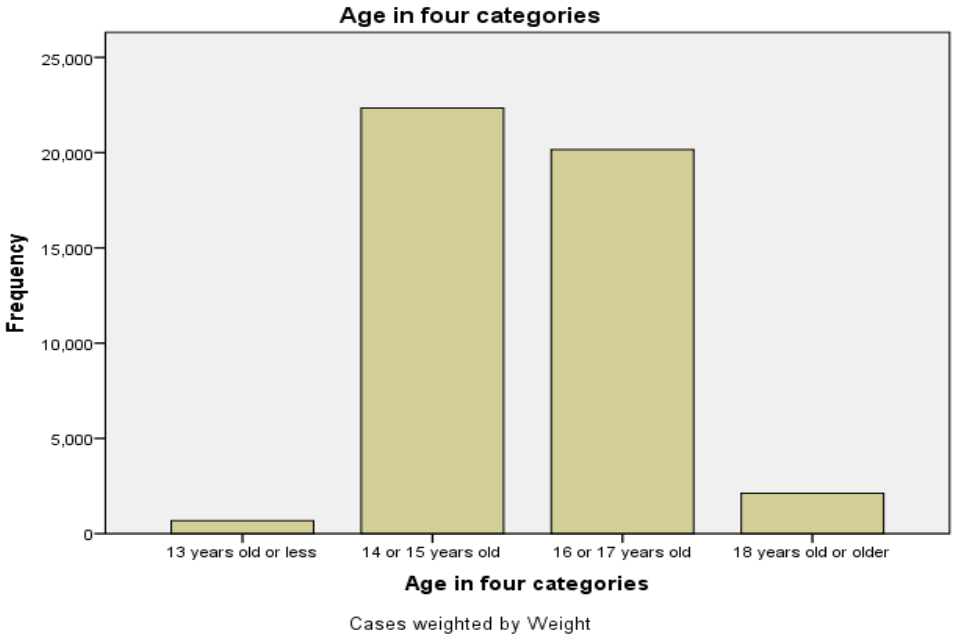

Figure 2. Participant's age distribution.

Race and Ethnicity

In terms of race and ethnicity, 0.6% (249) of the adolescents identified themselves as Indians/AK natives. Other race group categories identified among the participants in the study were 14.3% (6272) Asians, 22.3% (9756) Blacks, 0.5% (292) Native Hawaiians, 32.6% (14,286) Whites, 26.6% (11,659) Hispanic/Latino, and 3.2% (1386) mixed/multiple races. An illustration of race and ethnicity distribution is shown in Table 4 below.

Table 4.

A Sample of Descriptive Statistics by race

		Frequency	Percent	Valid percent	Cumulative percent
Valid	Am Indian/AK Native - NH	249	.5	.6	.6
	Asian - NH	6272	13.8	14.3	14.9
	Black or African American - NH	9756	21.5	22.3	37.2
	Native Hawaiian/OPI - NH	202	.4	.5	37.6
	White - NH	14286	31.4	32.6	70.2
	Hispanic/Latino	11659	25.6	26.6	96.8
	Multiple Races - NH	1386	3.0	3.2	100.0
	Total	43811	96.3	100.0	
Missing	System	1669	3.7		
Total		45479	100.0		

Montgomery County high school student population had a similar make up when compared to that of the adolescent student population for the state of Maryland which had a total high school adolescent male population of 50.8% and female population of 49.2%

(MDHMH, 2016). Race/ethnicity for the entire high school adolescent population in Maryland data was 34.9% Black, 12.8% Hispanic/Latino, 41.9% White, 6.9% All Other Races, and 3.6%. Multiple Races (MDHMH, 2016).

Results

The results contain descriptive statistics for the dependent variable (binge drinking), independent variables (being bullied, suicidality, substance use, protective factors), and covariates (gender, age, and race). Descriptive statistics for gender, age, and race was shown in Chapter 4, Table 1, 3, and 4 respectively. As described in Chapter 3, binary regression was used for the inferential analysis because the independent variable (being bullied, suicidality, substance use, and protective factors) and dependent variable (binge drinking) were all nominal levels of measurements and as a result met the logistic regression assumptions. The result section also contained information on whether to reject or not to reject the null hypothesis for the posed research questions.

Descriptive Statistics of the Primary Variables

Descriptive statistics of binge drinking. A total of 43,334 individuals responded to the binge drinking question. Binge drinking was reported in 11.5% (4,989) of the population while 88.5% were non-binge drinkers, and 4.7% (2,145) did not respond to the binge drinking question. This is illustrated in Table 5 and Figure 3.

Table 5.

A Sample of Descriptive Statistics of Binge Drinking

		Frequency	Percent	Valid percent	Cumulative percent
Valid	Binge Drinking	4989	11.0	11.5	11.5
	No Binge Drinking	38345	84.3	88.5	100.0
	Total	43334	95.3	100.0	
Missing	System	2145	4.7		
Total		45479	100.0		

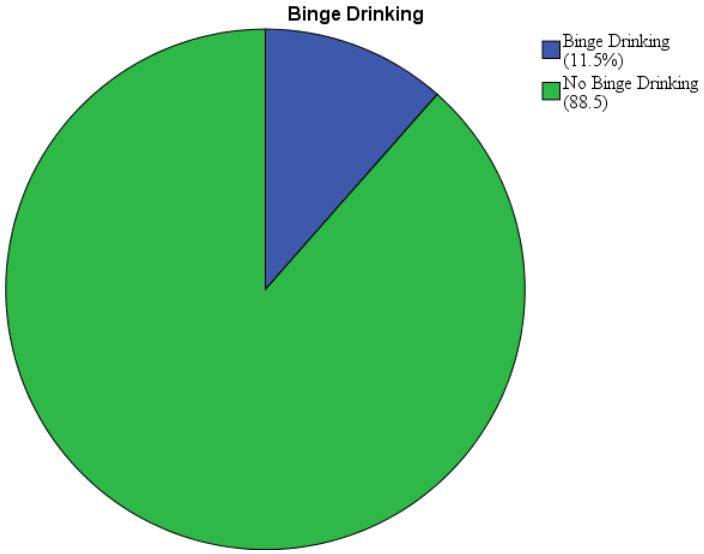

Figure 3. Pie chart illustrating a sample of the variable binge drinking

Descriptive statistics of being bullied. The variable being bullied was a measure of bully victims on school property. A total of 97.8% responded to the question about being bullied on school property while 2.2% did not respond. Out of those who responded,

17.5% experienced being bullied while 82.5% did not. This information is shown in Table 6 and Figure 4 below which illustrated the proportion of adolescents who experienced bullying and those who did not.

Table 6.

Sample of Descriptive Statistics of Being Bullied on School Property

		Frequency	Percent	Valid percent	Cumulative percent
Valid	Yes	7766	17.1	17.5	17.5
	No	36701	80.7	82.5	100.0
	Total	44467	97.8	100.0	
Missing	System	1012	2.2		
Total		45479	100.0		

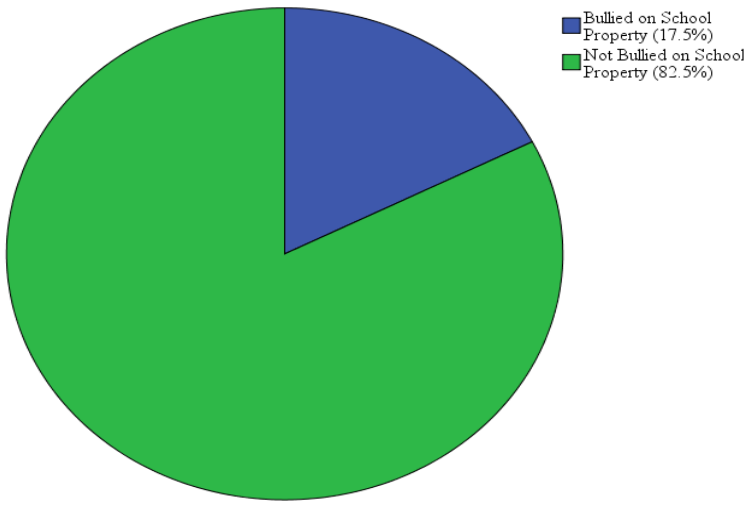

Figure 4. Pie chart illustrating a sample of the variable being bullied

Descriptive Statistics of Suicidality. The suicidality variable has two measures. The two measures are, considered suicide and made a suicide plan. For the measure considered suicide, 44,576 (98%) responded. Out of the adolescents that responded, 15.6% had considered suicide while 84.4% did not; see Table 7 and Figure 5. About 2% of the sample participant population did not respond to this measure. For the question about making or those who made a suicide plan, 44,826 (98%) responded of which 11.8% had made suicide plans and 88.2% had not. Those who did not respond made up 1.4% of the population. See Table 7, and Figure 5 below.

Table 7.

A Sample of Descriptive Statistics of Considered Suicide

		Frequency	Percent	Valid percent	Cumulative percent
Valid	Yes	6960	15.3	15.6	15.6
	No	37616	82.7	84.4	100.0
	Total	44576	98.0	100.0	
Missing	System	903	2.0		
Total		45479	100.0		

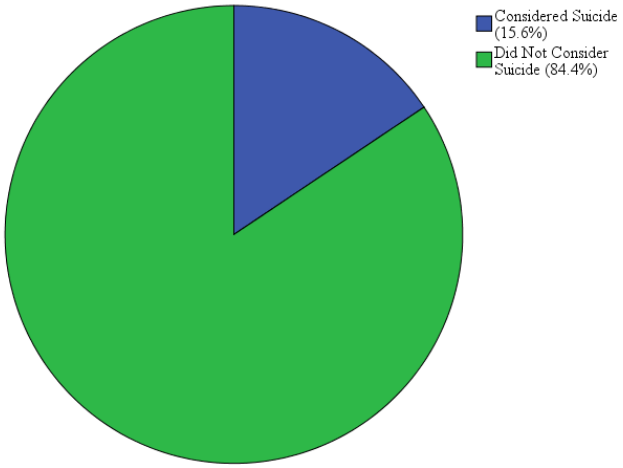

Figure 5. Adolescents who Considered suicide

Table 8.

A Sample of Descriptive Statistics of Made a Suicide Plan

		Frequency	Percent	Valid percent	Cumulative percent
Valid	Yes	5310	11.7	11.8	11.8
	No	39516	86.9	88.2	100.0
	Total	44826	98.6	100.0	
Missing	System	653	1.4		
Total		45479	100.0		

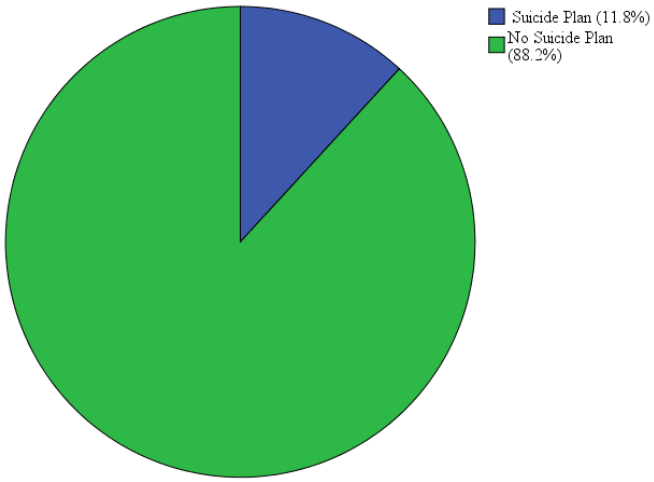

Figure 6. Adolescents who made a suicide plan

Descriptive Statistics of Substance use. Substance use has two measures which are 'ever marijuana use' and 'ever synthetic marijuana use'. For the 'ever marijuana use' category, a total of 42,985 responses was obtained of which 71.6% (30,774) indicated no marijuana use and 28.4% (12,211) indicated marijuana use. A total of 5.5% (2,494) did not respond to ever used marijuana, see Table 9 and Figure 7 below. For synthetic marijuana use, a total of 43,390 responded of which 6% (2,585) responded to using synthetic marijuana and 94% (40,805) responded to not using marijuana. About 4.6% of the total population did not respond. See Table 10 and Figure 8 below

Table 9. *A Sample of Descriptive Statistics of Ever Marijuana Use*

		Frequency	Percent	Valid percent	Cumulative percent
Valid	No Marijuana Use	30774	67.7	71.6	71.6
	Marijuana Use	12211	26.8	28.4	100.0
	Total	42985	94.5	100.0	
Missing	System	2494	5.5		
Total		45479	100.0		

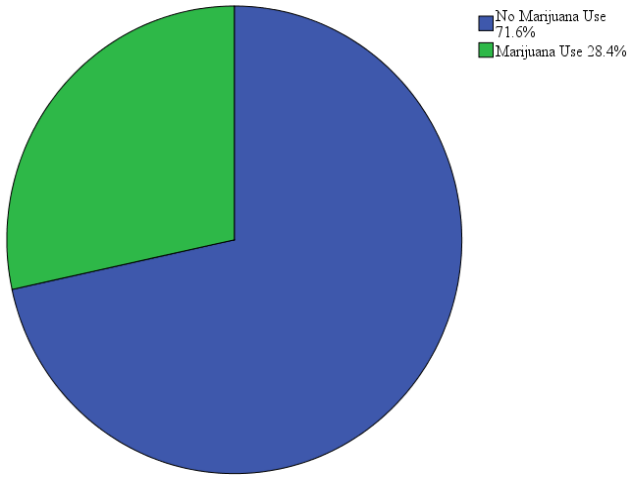

Figure 7. Ever marijuana use

Table 10.

A Sample of Descriptive Statistics of Ever Synthetic Marijuana Use

		Frequency	Percent	Valid percent	Cumulative percent
Valid	No Synthetic Marijuana Use	40805	89.7	94.0	94.0
	Synthetic Marijuana Use	2585	5.7	6.0	100.0
	Total	43390	95.4	100.0	
Missing	System	2089	4.6		
Total		45479	100.0		

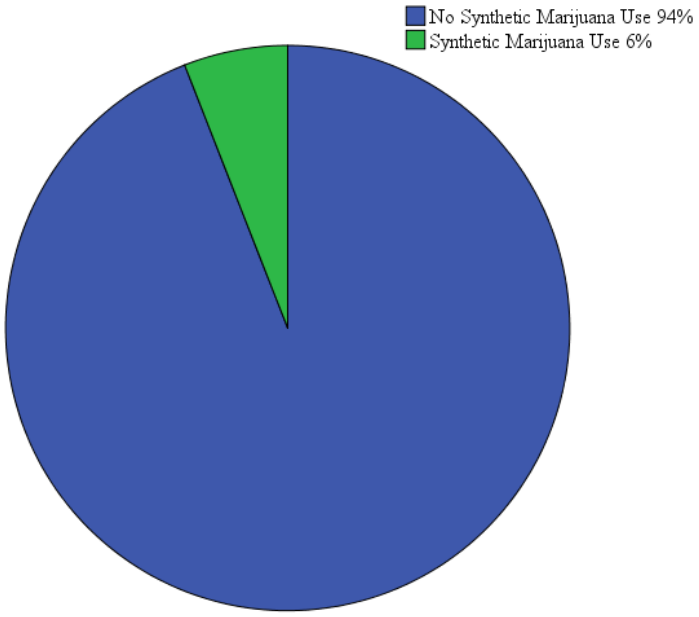

Figure 8. Ever synthetic marijuana use

Descriptive Statistics of Protective Factors. Protective factors have two measures which included having an adult other than the parent to seek help from; and also talking to a teacher or other adult at school about a problem. For having an adult other than parents to seek help from, there were a total of 41,633 (91.5%) responses of which 76.9% (32,031) indicated they had another adult to seek help from while 23.1% (9,602) did not. A total of 8.5% did not respond to this measure. In the second measure of being able to talk with a teacher or other adult about a problem at school, 40,630 (89.3%) responded of which 66.2% (26,905) indicated they would talk with a teacher about a problem. About 33.8% (13725) indicated they did not talk with a teacher or other adult about a problem; see Tables 11 and 12 below and also the pie charts, Figure 9 and 10, which illustrated valid responses.

Table 11.

A Sample of Descriptive Statistics of Having an Adult Other than a Parent to Seek Help From

		Frequency	Percent	Valid percent	Cumulative percent
Valid	No Adult to talk to	9602	21.1	23.1	23.1
	Adult to talk to	32031	70.4	76.9	100.0
	Total	41633	91.5	100.0	
Missing	System	3846	8.5		
Total		45479	100.0		

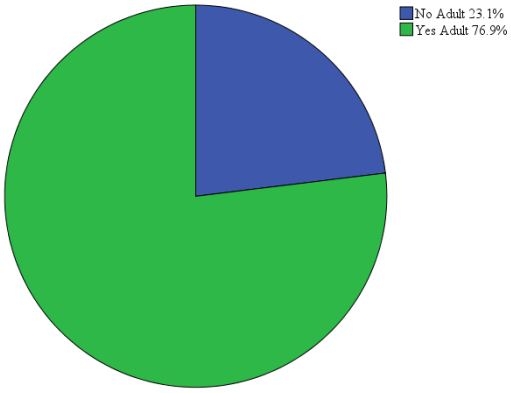

Figure 9. Having an adult other than parent to seek help from

Table 12.

A Sample of Descriptive Statistics of Having a Teacher or an Adult at School to Seek Help From

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes teacher or adult	13725	30.2	33.8	33.8
	No teacher or adult	26905	59.2	66.2	100.0
	Total	40630	89.3	100.0	
Missing	System	4849	10.7		
Total		45479	100.0		

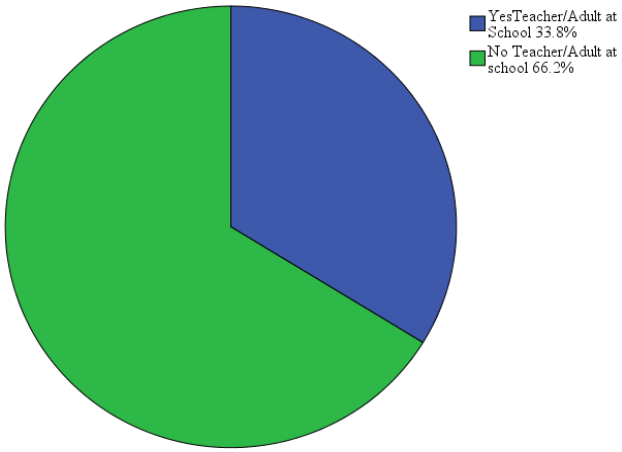

Figure 10. Having a teacher or adult at school to seek help from

Inferential Statistics

Research Question #1.

RQ1**:-** What is the association between being bullied and binge drinking among high school youths in Montgomery County Maryland controlling for gender, age and race?

H_{01}: There is no association between being bullied and binge drinking among high school youths in Montgomery County Maryland controlling for gender, age, and race.

H_{a1}: There is an association between being bullied and binge drinking among high school youths in Montgomery County Maryland controlling for gender, age, and race.

The model summary obtained from the statistical analysis describes the correlational relationship between being bullied and binge drinking in the sample population of adolescents currently enrolled in high schools in Montgomery County Maryland. The Cox and Snell estimate showed that 6.3% of binge drinking could be explained by being bullied. In contrast, the Nagelkerke estimate showed that 12.4% of

binge drinking behavior could be explained by adolescents who have been bullied.

The variables in equation table in table 13 shows there is an association between being bullied and binge drinking. The relationship represented here, *β = 0.400, W (1) = 98.538, OR = 1.49, p*** <0.001, 95% CI [1.378, 1.614]* showed that being bullied predicted binge drinking after controlling for race, age, and gender. Therefore, the null hypothesis should be rejected since *p*** <0.001*. For being bullied, the effect size (odds ratio (*OR*) was estimated at 1.5. Therefore, individuals who had been bullied were 1.5 times more likely to binge drink compared to those who had not been bullied. The beta values for adolescents who were being bullied indicated that for any change in unit value, there was an associated positive change of 0.4 in direction of binge drinking see Table 14 below. In the variable in the equation, Table 14 below, the effects of gender, age, and race were estimated and are described as follows:

For gender, the inferential analysis estimate was *β = -0.116, W (1) = 12.890, OR = 0.89, p*** <0.001, 95% CI [0.835, 0.948]*. Based on this estimate, gender had a statistically significant effect on binge drinking with being bullied. Females were 0.11 times less likely to engage in binge drinking than males. A negative beta value indicated for any unit change in being bullied, there was a -0.116 change in binge drinking, see Table 14 below.

In the presence of the variable 'being bullied', age had a statistically significant effect on binge drinking. This is reflected in *W (3) =1395* and *p *** <0.001*. The odds for the ages in four categories were as follows: For 13 years old or less, this age group

had no statistically significant effect on binge drinking with being bullied as the primary independent variable, *β = -0.194, W (1) = 2.146, OR = 0.823, p = 0.143, 95% CI [0.635, 1.068]*, see Table 13 below. Respondents thirteen year old or less were 0.177 times less likely to binge drink than those 18 years old or older.

For the 14 or 15 years old group; *β = 1.704, W (1) = 639.258, OR = 5.497, p*** <0.001, 95% CI [4.816, 6.273]*. Adolescents aged 14 or 15 years old were 5.497 times more likely to engage in binge drinking than those 18 years old or older. Based on the estimated beta value, for any one unit change in being bullied there was a positive 1.704 change in binge drinking, see Table 13 below.

For adolescents aged 16 or 17 years old; *β = 0.446, W (1) = 48.972, OR = 1.561, p*** <0.001, 95% CI [1.380, 1.767]*. Hence, adolescents aged 16 or 17 years old were 1.561 times more likely to engage in binge drinking than those 18 years old or older. Based on the beta estimate, for any one unit change in being bullied there was a positive 0.446 change in direction in binge drinking, see Table 13 below.

Race had a statistically significant effect on binge drinking with being bullied as the primary independent variable as shown in Table 13 below with the following estimated values *W (6) =1076.283* and *p *** <0.001*. The results in Table 14 could be described as follows;

For Indians/AK Natives; *β = -0.880, W (1) = 19.254, OR = 0.415, p*** <0.001, 95% CI [0.280, 0.614]*. Indians/AK natives were 0.585 times less likely to engage in

binge drinking than adolescents from multiple races. Based on the beta estimation, a unit change in being bullied had a -0.880 change in direction in binge drinking.

For Asians; *β = 1.275, W (1) = 128.429, OR = 3.577, p*** <0.001, 95% CI [2.869, 4.459]*. Asians were 3.577 times more likely to engage in binge drinking than adolescents from multiple races. Based on the beta estimation, a unit change in being bullied had a positive 1.275 change in direction in binge drinking.

For Blacks or African Americans; *β = 0.638, W (1) = 40.754, OR = 1.892, p*** <0.001, 95% CI [1.556, 2.301]*. Blacks or African Americans were 1.892 times more likely to engage in binge drinking than adolescents from multiple races. Based on the beta estimates, a unit change in being bullied had a positive 0.636 change in direction in binge drinking.

For Native Hawaiians; *β = 0.360, W (1) = 1.810, OR = 1.433, p = 0.179, 95% CI [0.848, 2.421]*. Being bullied and a Native Hawaiian was not statistically significant, with a *p = 0.179.* However, Native Hawaiians were 1.433 times more likely to engage in binge drinking than adolescents from multiple races. Based on beta value, a unit change in being bullied had a positive 0.360 change in direction in binge drinking.

For Whites; *β = -0.472, W (1) = 25.399, OR = 0.624, p*** <0.001, 95% CI [0.519, 0.749]*. Whites were 0.376 times less likely to engage in binge drinking than adolescents from multiple races. Based on the beta estimate, a unit change in being bullied had a -0.472 change in direction in binge drinking.

Hispanics/Latino: *β = 0.250, W (1) = 6.73, OR = 1.284, p = 0.009, 95% CI [1.063, 1.550]*. Hispanics/Latinos were 1.284 times more likely to engage in binge drinking than adolescents from multiple races. Based on the beta estimate, a unit change in being bullied had a 0.250 change in direction in binge drinking.

Table 133.

Effects of Being Bullied, Gender, Age, Race on Binge Drinking

								95% C.I.for EXP(B)	
		B	S.E.	Wald	df	Sig.	Exp(B)	Lower	Upper
Step 1[a]	Bullying at school	.400	.040	98.538	1	.000	1.491	1.378	1.614
	Female	-.116	.032	12.890	1	.000	.890	.835	.948
	Ages			1395.470	3	.000			
	≤ 13 years old	-.194	.133	2.146	1	.143	.823	.635	1.068
	14 or 15	1.704	.067	639.258	1	.000	5.497	4.816	6.273
	16 or 17	.446	.063	49.872	1	.000	1.561	1.380	1.767
	Race			1076.283	6	.000			
	Indians/AK Natives	-.880	.201	19.254	1	.000	.415	.280	.614
	Asians	1.275	.112	128.429	1	.000	3.577	2.869	4.459
	Blacks or African Americans	.638	.100	40.754	1	.000	1.892	1.556	2.301
	Native Hawaiians	.360	.268	1.810	1	.179	1.433	.848	2.421
	Whites	-.472	.094	25.399	1	.000	.624	.519	.749
	Hispanics/Latino	.250	.096	6.733	1	.009	1.284	1.063	1.550
	Constant	.791	.114	47.743	1	.000	2.205		

a. Variable(s) entered on step 1: Bullying at school, Females, Ages, Race.

Research Question #2

RQ2: What is the association between suicidality and binge drinking among high school youths in Montgomery County Maryland controlling for age, gender and race?

H_{02}: There is no association between suicidality and binge drinking among high school youths in Montgomery County Maryland controlling for age, gender and race.

H_{a2}: There is an association between suicidality and binge drinking among high school youths in Montgomery County Maryland controlling for age, gender and race.

The model summary from the statistical analysis indicated there was an association between suicidality and binge drinking. The Cox and Snell estimate showed that 7.3% of binge drinking could be explained by suicidality. In contrast, the Nagelkerke estimate showed that 14.4% of binge drinking behavior could be explained by suicidality.

The variables in equation in Table 14 below shows there is an association between suicidality and binge drinking. The relationship represented here, *β = -0.781, W (1) = 267.675, OR = 0.458, p*** <0.001, 95% CI [0.417, 0.503]* showed a statistically significant association between adolescents who considered suicide and binge drinking. Similarly, *β = -0.319, W (1) = 34.157, OR = 0.727, p*** <0.001, 95% CI [0.653, 0.809]* values were estimated among adolescents who made suicide plans. Therefore, the null hypothesis should be rejected, *p*** <0.001* controlling for race, age, gender. For considered suicide, the effect size (odds ratio (*OR*) was estimated at 0.458 and for made suicide plans, the OR was estimated at 0.727. Therefore, individuals who considered suicide and made suicide plans were 0.542 and 0.273 respectively less likely to likely to binge drink compared to those who did not consider suicide or make suicide plans. The

beta values for adolescents who considered suicide and made suicide plans indicated that for any change in unit value, there was an associated negative change (-0.781 and -0.319 respectively) in direction of binge drinking see Table 14 below.

The effects of the covariates of gender, age and race was shown in Table 16 below and described as follows; For gender, the following relationship was seen β = -*.065, W (1) = 3.902, OR = .937, p = 0.048, 95% CI [0.878, 0.999]*. Gender had significant effect on binge drinking with suicidality as the primary independent variable. Girls were 0.063 times less likely to engage in binge drinking than boys. Based on the beta estimate, for any unit change in suicidality, there was a negative 0.065 (-0.065) change in binge drinking.

Age had a statistically significant effect on binge drinking with suicidality as the primary independent variable. This is reflected in the inferential analysis estimate; *W (3) =1284.014, p *** <0.001*. The risk estimates for the specified age groups or categories are described as follows; 13 years old or less had no statistically significant effect on binge drinking when added in the model with suicidality, *β = 0.212, W(1) = 2.324, OR = 1.236, p = 0.127, 95% CI [0.941, 1.622]*. However, adolescents aged 13 years old or less were 1.236 times more likely to engage in binge drinking than 18 years old or older. In this analysis, for any unit change in suicidality, there is a 0.212 unit change in binge drinking.

The effect of suicidality on binge drinking among adolescents aged 14 or 15 years old shows an estimate of *β = 1.727, W(1) = 657.981, OR = 5.622, p*** <0.001, 95% CI*

[4.927, 6.415]. In this estimation, adolescents aged 14 or 15 years old were 5.622 times more likely to engage in binge drinking than 18 years old or older. As such, for any one unit change in suicidality, there is a 1.727 change in a positive direction for binge drinking.

The effects of suicidality on binge drinking among adolescents aged 16 or 17 years old shows a risk estimate of $\beta = 0.525$, *W(1) = 69.129, OR = 1.690, p*** <0.001, 95% CI [1.493, 1.913]*. This age group of adolescents were 1.69 times more likely to engage in binge drinking than 18 years old or older. In this analysis, for any one unit change in suicidality, there is a 0.525 change in direction in binge drinking.

When race was added in the model with suicidality, there was a statistically significant effect on binge drinking. Shown in Table 16 below the following estimate described the association between suicidality with race and binge drinking; *W (6) =1078.586, p *** <0.001*. The effects of the specific race groups could be described as follows: As shown in Table 15 below, Indians/AK Natives risk estimate was $\beta = -0.694$, *W(1) = 9.986, OR = 0.500, p = 0.002, 95% CI [0.325, 0.768]*. In other words, Indians/AK natives were 0.5 times less likely to engage in binge drinking than adolescents from multiple races. Based on the beta value estimate, a unit change in suicidality had a -0.694 change in direction in binge drinking.

For Asians, suicidality effect on binge drinking was statistically significant; $\beta = 1.127$, *W (1) = 106.158, OR = 3.087, p*** <0.001, 95% CI [2.491, 3.825]*. For adolescents who were suicidal, Asians were 3.087 times more likely to engage in binge

drinking than adolescents from multiple races. Based on the beta estimate, a unit change in suicidality among Asians had a 1.127 change in direction in binge drinking.

Similarly, suicidality effect on binge drinking among Blacks or African Americans was statistically significant; *β = 0.689, W (1) = 48.411, OR = 1.992, p*** <0.001, 95% CI [1.641, 2.419]*. In other words, Blacks or African Americans were 1.992 times more likely to engage in binge drinking than adolescents from multiple races. Based on the beta estimate, a unit change in suicidality among Black or African Americans had a 0.689 change in direction in binge drinking.

For Native Hawaiians, suicidality effects on binge drinking was not statistically significant; *β = 0.431, W (1) = 2.568, OR = 1.538, p = 0.109, 95% CI [0.908, 2.606]* when gender, age**.** In this analysis, Native Hawaiians were 1.538 times more likely to engage in binge drinking than adolescents from multiple races. For the beta estimate, a unit change in suicidality among Native Hawaiians had a 0.431 change in direction in binge drinking.

For Whites, suicidality effects on binge drinking was statistically significant; *β = -0.478, W (1) = 26.681, OR = 0.620, p*** <0.001, 95% CI [0.517, 0.743]*. Whites were 0.38 times less likely to engage in binge drinking than adolescents from multiple races. Based on the beta estimate, a unit change in suicidality among Whites had a -0.472 change in direction in binge drinking.

For Hispanics/Latino, suicidality effects on binge drinking was statistically significant; *β = 0.321, W (1) = 11.356, OR = 1.378, p = 0.001, 95% CI [1.144, 1.661]*.

Hispanics/Latinos were 1.378 times more likely to engage in binge drinking than adolescents from multiple races. For the beta estimate, a unit change in suicidality had a 0.321 change in direction in binge drinking.

Table 144.

Effects of Suicidality, Gender, Age, Race on Binge Drinking

								95% C.I.for EXP(B)	
		B	S.E.	Wald	df	Sig.	Exp(B)	Lower	Upper
Step 1[a]	Considered suicide	-.781	.048	267.675	1	.000	.458	.417	.503
	Made a Suicide Plan	-.319	.055	34.157	1	.000	.727	.653	.809
	Female	-.065	.033	3.902	1	.048	.937	.878	.999
	Ages			1284.014	3	.000			
	≤ 13 years old	.212	.139	2.324	1	.127	1.236	.941	1.622
	14 or 15	1.727	.067	657.981	1	.000	5.622	4.927	6.415
	16 or 17	.525	.063	69.129	1	.000	1.690	1.493	1.913
	Race			1078.586	6	.000			
	Indians/AK Natives	-.694	.220	9.986	1	.002	.500	.325	.768
	Asians	1.127	.109	106.158	1	.000	3.087	2.491	3.825
	Blacks or African Americans	.689	.099	48.411	1	.000	1.992	1.641	2.419
	Native Hawaiians	.431	.269	2.568	1	.109	1.538	.908	2.606
	Whites	-.478	.093	26.681	1	.000	.620	.517	.743

Hispanics/Latino	.321	.095	11.356	1	.001	1.378	1.144	1.661
Constant	1.215	.108	125.540	1	.000	3.369		

a. Variable(s) entered on step 1: Considered suicide, Made a suicide plan, Females, Ages, Race.

Research Question #3

RQ3**:** What is the association between substance use and binge drinking among high school youths in Montgomery County Maryland controlling for gender, age and race?

H_{03}: There is no association between substance use and binge drinking among high school youths in Montgomery County Maryland controlling for gender, age and race.

H_{a3}: There is association between substance use and binge drinking among high school youths in Montgomery County Maryland controlling for gender, age and race.

The model summary from the statistical analysis indicated there was an association between substance use and binge drinking. The Cox and Snell estimate shows that 19.8% of binge drinking could be explained by substance use. In contrast, the Nagelkerke estimate showed that 38.8% of binge drinking behavior could be explained by substance use.

The variables in equation in Table 15 below shows there is an association between substance use and binge drinking. The relationship represented here, $\beta = 2.684$,

*W (1) = 3537.346, OR = 14.647, p*** <0.001, 95% CI [13.407, 16.002]* showed a statistically significant association between adolescents who used marijuana and binge drinking. Similarly, *β = 1.203, W (1) = 452.391, OR = 3.330, p*** <0.001, 95% CI [2.980, 3.720]* was the risk estimate for binge drinking among adolescents who used synthetic marijuana. After controlling for gender, age, and race for the association between synthetic marijuana use and binge drinking, the null hypothesis should be rejected, *p*** <0.001*.

For adolescents who used marijuana, the *OR* estimate was 14.647 and for those who used synthetic marijuana, the OR estimate was 3.330. Therefore, individuals who used marijuana and synthetic marijuana were 14.647 and 3.330 times respectively more likely to binge drink compared to those who did not use marijuana or synthetic marijuana. The beta values for adolescents who used marijuana and synthetic marijuana indicated that for any change in unit value, there was an associated positive change of 2.684 and 1.203 units respectively in binge drinking. The effects of the covariates of gender, age and race was shown in Table 15 below and described as follows;

For gender, the estimated risk was *β = -0.270, W (1) = 52.508, OR = .764, p*** <0.001, 95% CI [0.710, 0.821]*. In other words, gender had a statistically significant effect on binge drinking with substance use as the primary independent variable. Girls were 0.236 times less likely to engage in binge drinking than boys. A negative beta value means that for any unit change in substance use, there was a 0.270 change in binge drinking in the opposite direction.

Age had a statistically significant effect on binge drinking with substance use. The risk estimate shown in Table 15 was statistically significant, *W (3) =319.706*, p *** *<0.001*. The risk estimates for the specified age groups are described as follows; adolescents ≤13 years old had no statistically significant effect on binge drinking when added in the model with substance use. *β = 0.009, W (1) = 0.003, OR = 1.009, p= 0.960, 95% CI [0.714, 1.425]*. In this estimate for any unit change in substance use, there was a 0.009 unit change in binge drinking. Adolescents ≤13 years old were 1.009 times as likely to engage in binge drinking as individuals ≥18 years old.

The effect of substance use on binge drinking among adolescents aged 14 or 15 years old shows an estimate of: *β = 1.128, W (1) = 199.716, OR = 3.091, p*** <0.001, 95% CI [2.643, 3.614]*. Adolescents aged 14 or 15 years who engaged in substance use were 3.091 times more likely to engage in binge drinking than 18 years old or older. In this analysis, for any one unit change in substance use, there was a 1.128 change in direction in binge drinking.

For adolescents 16 or 17 years old, the effect of substance use on binge drinking was estimated as follows: *β = 0.521, W (1) = 47.212, OR = 1.684, p*** <0.001, 95% CI [1.452, 1.954]*. In other words, adolescents 16 or 17 years old were 1.684 times more likely to engage in binge drinking than individuals 18 years old or older. For this age group risk estimate, for any unit change in substance use, there was a 0.521 change in binge drinking, see Table 15.

When race was added to the model with substance use, there was a statistically significant effect on binge drinking as shown in Table 15 below. The following estimate described the association between substance use with race and binge drinking: W (6) =1037.666 and p *** <0.001. The different races are described as follows:

For Indians/AK Natives, substance use effects on binge drinking was not statistically significant; β = -0.140, W (1) = 0.221, OR = 0.869, p=0.638, 95% CI [0.485, 1.559]. Indians/AK natives were 0.131 times less likely to engage in binge drinking than adolescents from multiple races. For the beta estimate, a unit change in substance use had a -0.140 change in the opposite direction for binge drinking.

For Asians, substance use effect on binge drinking was statistically significant; β = 0.461, W (1) = 14.205, OR = 1.586, p*** <0.001, 95% CI [1.248, 2.015]. Asians were 1.586 times more likely to engage in binge drinking than adolescents from multiple races. For the beta estimate, a unit change in substance use had a 0.461 change in binge drinking.

For Blacks or African Americans, substance use effect on binge drinking was statistically significant; β = 0.702, W (1) = 39.399, OR = 2.018, p*** <0.001, 95% CI [1.621, 2.513]. Blacks or African Americans were 2.018 times more likely to engage in binge drinking than adolescents from multiple races. Based on the beta estimate, a unit change in substance use had a 0.702 change in binge drinking.

For Native Hawaiians, substance use effect on binge drinking was statistically significant; β = 0.623, W (1) = 4.471, OR = 1.864, p = 0.034, 95% CI [1.047, 3.319].

Native Hawaiians were 1.864 times more likely to engage in binge drinking than adolescents from multiple races. For the beta estimate, a unit change in substance use had a 0.623 change in binge drinking.

Similarly, substance use effect among Whites on binge drinking was statistically significant; β = -0.747, W (1) = 49.717, OR = 0.474, p*** <0.001, 95% CI [0.385, 0.583]. Whites were 0.526 times less likely to engage in binge drinking than adolescents from multiple races. For the beta estimate, a unit change in substance use had a -0.747 change in the opposite direction for binge drinking.

For Hispanics/Latino, substance use effects on binge drinking was statistically significant; β = 0.351, W (1) = 10.544, OR = 1.421, p = 0.001, 95% CI [1.149, 1.756]. Hispanics/Latinos were 1.421 times more likely to engage in binge drinking than adolescents from multiple races. For the beta estimate, a unit change in substance use had a 0.351 change in binge drinking, see Table 15.

Table 155.

Effects of Substance Use, Age, Gender and Race on Binge Drinking

								95% C.I.for EXP(B)	
		B	S.E.	Wald	df	Sig.	Exp(B)	Lower	Upper
Step 1[a]	Marijuana Use	2.684	.045	3537.346	1	.000	14.647	13.407	16.002
	Synthetic Marijuana Use	1.203	.057	452.391	1	.000	3.330	2.980	3.720
	Female	-.270	.037	52.508	1	.000	.764	.710	.821
	Ages			319.706	3	.000			
	≤ 13 years old	.009	.176	.003	1	.960	1.009	.714	1.425
	14 or 15	1.128	.080	199.716	1	.000	3.091	2.643	3.614
	16 or 17	.521	.076	47.212	1	.000	1.684	1.452	1.954
	Race			1037.666	6	.000			
	Indians/AK Natives	-.140	.298	.221	1	.638	.869	.485	1.559
	Asians	.461	.122	14.205	1	.000	1.586	1.248	2.015
	Blacks or African Americans	.702	.112	39.399	1	.000	2.018	1.621	2.513
	Native Hawaiians	.623	.294	4.471	1	.034	1.864	1.047	3.319
	Whites	-.747	.106	49.717	1	.000	.474	.385	.583
	Hispanics/Latino	.351	.108	10.544	1	.001	1.421	1.149	1.756
	Constant	-.864	.132	42.648	1	.000	.421		

a. Variable(s) entered on step 1: Marijuana Use, Synthetic Marijuana Use, Female, Ages, Race.

Research Question #4

RQ4: What is the association between having an adult other than your parent to seek help from (protective factors), and binge drinking among high school youths in Montgomery County Maryland controlling for age, gender and race?

H_{04}: There is no association between having an adult other than your parent to seek help from (protective factors), and binge drinking among high school youths in Montgomery County Maryland controlling for age, gender and race.

H_{a4}: There is an association between having an adult other than your parent to seek help from (protective factors), and binge drinking among high school youths in Montgomery County Maryland controlling for age, gender and race.

The model summary from the statistical analysis indicated that there is an association between protective factors and binge drinking. The Cox and Snell estimate shows that 6.2% of binge drinking could be explained by protective factors. In contrast, the Nagelkerke estimate showed that 12.1% of binge drinking behavior could be explained by protective factors.

The variables in equation in Table 16 below shows there is an association between protective factors and binge drinking. The risk estimate for this relationship was shown as follows; *β = -.242, W (1) = 37.089, OR = 0.785, p*** <0.001, 95% CI [0.727, 0.849]*. The risk estimation was statistically significant for the association between adolescents who had an adult other than their parents to talk to and binge drinking. Similarly, *β = -0.097, W (1) = 7.620, OR = 0.908, p = 0.006, 95% CI [0.848, 0.972]* was statistically significant for binge drinking among adolescents who had a teacher or an adult to talk to at school after controlling for race, age, and gender. Therefore, the null hypothesis was rejected.

For those who had an adult other than their parents to talk to, the *OR* estimate

was 0.785, and for those who had a teacher or an adult at school to talk to, the OR was estimated at 0.908. Therefore, individuals who had an adult other than their parents to talk to and those who had a teacher or an adult at school to talk were 0.215 and 0.092 respectively less likely to binge drink compared to those who did not have an adult other than their parents to talk to and those who did not have a teacher or and adult at school to talk to. The beta values for adolescents who had an adult other than their parents to talk to and those who had a teacher or an adult at school to talk showed that for any change in unit value, there was a negative change of -0.242 and -0.097 respectively in binge drinking. The effects of gender, age, and race was also shown in Table 16 below and described as follows;

For gender, the risk estimate for binge drinking was $\beta = -0.164$, $W(1) = 24.010$, $OR = 0.848$, $p^{***} < 0.001$, 95% CI [0.794, 0.906]. Gender had a statistically significant effect on binge drinking with protective factors as the primary independent variable. Girls were 0.152 times less likely to engage in binge drinking than boys. The beta value indicated that for any unit change in protective factors, there was a -0.164 change in binge drinking in the opposite direction.

Age had a statistically significant effect on binge drinking with substance use as the primary independent variable. This is reflected in the inferential risk estimate; $W(3) = 1303.504$ and $p^{***} < 0.001$. The risk estimates for the specified age groups or categories are described as follows; Binge drinking among adolescents 13 years old or less had a statistically significant when age was added to the model with protective

factors; *β = -0.238, W (1) = 3.007, OR = 0.788, p = 0.079, 95% CI [0.604, 1.028]*. In this analysis with age in the model, for any unit change in protective factors, there was a -0.238 unit change in binge drinking. Adolescents aged 13 years old or less were 0.212 times less likely to engage in binge drinking than individuals aged 18 years or older.

Adolescents aged 14 or 15 years old showed an estimate of *β = 1.751, W (1) = 634.075, OR = 5.759, p*** <0.001, 95% CI [5.025, 6.600]*. In this analysis14 or 15 years old adolescents who had protective factors were 5.759 times more likely to engage in binge drinking than individuals 18 years or older. As such, for any unit change in protective factors, there is a 1.751 change in binge drinking.

The effects of protective factors on binge drinking among adolescents 16 or 17 years old showed a risk estimate of; *β = 0.513, W (1) = 62.444, OR = 1.671, p*** <0.001, 95% CI [1.471, 1.897]*. Adolescents aged 16 or 17 years old were 1.671 times more likely to engage in binge drinking than individuals aged 18 years or older. In the analysis, for any one unit change in protective factors, there was a positive 0.513 change in binge drinking.

When race was added in the model with protective factors, there was a statistically significant effect on binge drinking. Shown in Table 16 below, the following estimate described the relationship between protective factors with race and binge drinking; *W (6) =994.184* and *p *** <0.001*. The different races are described below;

Indians/AK Natives: *β = -0.641, W (1) = 8.334, OR = 0.527, p = 0.004, 95% CI [0.341, .814]*. In other words, Indians/AK natives were 0.473 times less likely to engage

in binge drinking than adolescents from multiple races. Based on the beta value estimate, a unit change in protective factors had -0.641 change in binge drinking.

For Asians, protective factors effect on binge drinking was statistically significant; *β = 1.197, W (1) = 117.497, OR = 3.309 p*** <0.001, 95% CI [2.665, 4.108]*. Asians were 3.309 times more likely to engage in binge drinking than adolescents from multiple races. Based on the beta value estimates, a unit change in protective factors had a positive 1.197 change in binge drinking.

Similarly, protective factor effect among Blacks or African Americans was statistically significant; *β = 0.727, W (1) = 51.841, OR = 2.069, p*** <0.001, 95% CI [1.697, 2.522]*. Blacks or African Americans were 2.069 times more likely to engage in binge drinking than adolescents from multiple races. Based on the beta value estimates, a unit change in protective factors had a 0.727 change in direction in binge drinking.

For Native Hawaiians, protective factor effects on binge drinking was statistically significant among the adolescents; *β = 0.814, W (1) = 5.992, OR = 2.257, p = 0.014, 95% CI [1.176, 4.332]*. Native Hawaiians adolescents were 2.257 times more likely to engage in binge drinking than individuals from multiple races. Based on the beta value estimates; a unit change in protective factors had a 0.814 change in binge drinking.

For Whites, protective factor effects on binge drinking was statistically significant; *β = -0.422, W (1) = 20.152, OR = 0.656, p*** <0.001, 95% CI [0.545, 0.788]*. Whites were 0.344 times less likely to engage in binge drinking than adolescents

from multiple races. Based on the beta value estimates, a unit change in protective factors had a -0.422 change in binge drinking.

For Hispanics/Latino, protective factor effects on binge drinking was statistically significant; $\beta = 0.276$, $W(1) = 8.127$, $OR = 1.318$, $p = 0.004$, 95% CI [1.090, 1.593]. Hispanics/Latinos were 1.318 times more likely to engage in binge drinking than adolescents from multiple races. Based on the beta value estimates, a unit change in protective factors had a 0.276 change in binge drinking.

Table 166.

Effects of Protective Factors, Age, Gender, Race on Binge Drinking

								95% C.I.for EXP(B)	
		B	S.E.	Wald	df	Sig.	Exp(B)	Lower	Upper
Step 1[a]	Adult to talk to	-.242	.040	37.089	1	.000	.785	.727	.849
	Adult/Teacher to talk to at school	-.097	.035	7.620	1	.006	.908	.848	.972
	Female	-.164	.034	24.010	1	.000	.848	.794	.906
	Ages			1303.504	3	.000			
	≤ 13 years old	-.238	.136	3.077	1	.079	.788	.604	1.028
	13 or 14 years old	1.751	.070	634.075	1	.000	5.759	5.025	6.600
	15 or 16 years old	.513	.065	62.444	1	.000	1.671	1.471	1.897
	Race			994.184	6	.000			
	Indians/AK Natives	-.641	.222	8.334	1	.004	.527	.341	.814
	Asians	1.197	.110	117.497	1	.000	3.309	2.665	4.108
	Black or African American	.727	.101	51.841	1	.000	2.069	1.697	2.522
	Native Hawaiian	.814	.333	5.992	1	.014	2.257	1.176	4.332
	Whites	-.422	.094	20.152	1	.000	.656	.545	.788
	Hispanics/Latino	.276	.097	8.127	1	.004	1.318	1.090	1.593
	Constant	1.125	.112	101.527	1	.000	3.081		

a. Variable(s) entered on step 1: Adult to talk to, Adult/Teacher to talk to at school, Female, Ages, Race.

Research Question #5

RQ5 **:** What is the association between being bullied, suicidality, substance use and having an adult other than your parent to seek help from (protective factors), and binge drinking among high school youths in Montgomery County Maryland controlling for age, gender and race?

H_{05}: There is no association between being bullied, suicidality, substance use and in having an adult other than your parent to seek help from (protective factors) and binge drinking among high school youths in Montgomery County Maryland controlling for age, gender and race.

H_{a5}: There is an association between being bullied, suicidality, substance use and in having an adult other than your parent to seek help from (protective factors) and binge drinking among high school youths in Montgomery County Maryland controlling for age, gender and race.

The model summary from the statistical analysis indicated there is an association between all independent variables (being bullied, suicidality, substance use and protective factors) and binge drinking. The Cox and Snell estimate shows that 19.4% of binge drinking could be explained by the independent variables while, the Nagelkerke estimate showed that 38.5% of binge drinking behavior could be explained by independent variables.

Shown in Table 17 is the assessment of the combined effect of being bullied, suicidality, substance use and protective factors, their effects were shown as follows;

Being bullied estimate was; *β = -0.123, W (1) = 5.144, OR = 0.884, p = 0.023, 95% CI [0.795, 0.983]*. Suicidality measures were considered suicide; *β = -0.411, W (1) = 45.321, OR = 0.663, p*** <0.001, 95% CI [0.588, 0.747]*, and made a suicide plan; *β = -0.228, W (1) = 11.328, OR = 0.796, p*** <0.001, 95% CI [0.697, 0.909]*. Substance use measures were marijuana *use; β = 2.588, W (1) = 3004.153, OR = 13.301, p*** <0.001, 95% CI [12.126, 14.591]* and synthetic marijuana *β = 0.984, W (1) = 241.459, OR = 2.675, p*** <0.001, 95% CI [2.363, 3.029]*. Protective factor measures were either having an adult other than parent to talk to with a risk estimate of; *β = 0.060, W (1) = 1.476, OR = 1.062, p = 0.224, 95% CI [0.964, 1.170]*; and having a teacher or an adult at school to talk to with a risk estimate of; *β = 0.138, W (1) = 10.799, OR = 1.148, p*** <0.001, 95% CI [1.057, 1.246]*. All measures of independent variables were statistically significant with a p value < 0.05 except for having an adult other than a parent to talk to which had a p = 0.224. The measures considered suicide, marijuana use and synthetic marijuana use were most significant with all having same values of *p*** <0.001*. Made a suicide plan and having a teacher or an adult to talk to at school followed next with significant values of *p = 0.001* and being bullied with a significant value of *p = 0.023*.For covariates, only adolescents aged ≤ 13 years old did not produce a statistically significant result, *p = 0.195*. Comparing statistical significance, substance use had the highest level of statistical significance with both measures having *p values <0.001*, followed by suicidality with both measures having *p value < 0.001* for 'considered suicide' and 0.001 for 'made suicide plans'. In terms of the effects size, substance use had the highest effect

size with marijuana having an effect size of 13.301 and synthetic marijuana with 2.675 OR, followed by protective factor of having an adult other than parent to talk to, having an effect size of 1.062 and adolescents having a teacher or an adult at school to talk to with an effect size of 1.148.

For the covariates, gender had an effect size of 0.796. With regards to age, adolescents aged 14 or 15 years old had the highest effect size of 3.184, followed by individuals aged 16 or 17 years old with an OR value of 1.647. In the race category, Native Hawaiian had the highest effect size with an OR value of 2.105 followed closely by Black or African American adolescents with an effect size of 1.998. Whites and Indian had almost same effect size of 0.453 and 0.457 respectively.

For beta unit changes, substance use specifically marijuana use had the highest change in direction per unit value of independent variables with a beta value of 2.588 followed by synthetic marijuana with a beta value of 0.984 while suicidality, specifically the measure considered suicide had the least (most negative) change in direction with a beta value of -0.411 followed by made a suicide plan with a betta value of -0.228. For covariates, adolescents aged 14 or 15 years old had the highest change in direction per unit value with a beta value of 1.158. In terms of race, Native Hawaiians had the highest change with a beta value of 0.744 per unit change, followed closely by Blacks with a beta value of 0.692, while Indians and Whites similar negative beta values of -0.784 and -0.793 respectively.

Table 177.

Effects of Being Bullied, Suicidality, Substance Use, Protective Factors, Gender, Age, Race on Binge Drinking

							95% C.I.for EXP(B)	
		B	S.E.	Wald	df	Sig.	Exp(B)	Lower	Upper
Step 1[a]	Bullying)	-.123	.054	5.144	1	.023	.884	.795	.983
	Considered suicide	-.411	.061	45.321	1	.000	.663	.588	.747
	Made a suicide plan	-.228	.068	11.328	1	.001	.796	.697	.909
	Marijuana Use	2.588	.047	3004.153	1	.000	13.301	12.126	14.591
	Synthetic Marijuana Use	.984	.063	241.459	1	.000	2.675	2.363	3.029
	Adult to talk to	.060	.049	1.476	1	.224	1.062	.964	1.170
	Adult/Teacher to talk to at school	.138	.042	10.799	1	.001	1.148	1.057	1.246
	Female	-.228	.040	32.084	1	.000	.796	.736	.861
	Ages			311.622	3	.000			
	≤ 13 years old	-.255	.197	1.680	1	.195	.775	.526	1.140
	14 to 15 years old	1.158	.087	176.143	1	.000	3.184	2.683	3.777
	16 or 17 years old)	.499	.083	36.592	1	.000	1.647	1.401	1.936
	Races			975.297	6	.000			
	Indians/AK Natives	-.784	.305	6.618	1	.010	.457	.251	.830
	Asians	.566	.130	19.014	1	.000	1.762	1.366	2.272
	Blacks/African Americans	.692	.118	34.375	1	.000	1.998	1.585	2.517

	Native Hawaiians	.744	.350	4.512	1	.034	2.105	1.059	4.185
	Whites	-.793	.111	51.340	1	.000	.453	.364	.562
	Hispanics/Lantino	.305	.113	7.271	1	.007	1.357	1.087	1.694
	Constant	-.525	.144	13.346	1	.000	.591		

a. Variable(s) entered on step 1: Bullying at school, Considered suicide, Made a suicide plan, Marijuana Use, Synthetic Marijuana Use, Adult to talk to, Adult/Teacher to talk to at school, MDQ2. Female, Ages, Races

Summary

This chapter focused on answering the five research questions by examining the associations between adolescent binge drinking and being bullied, suicidality, substance use and having an adult other than one's parents to seek help from (protective factors) among high school youths in Montgomery County Maryland controlling for gender, age and race. Logistic regression was used to examine these associations and their significance. The dependent variable was binge drinking, the independent variables were being bullied, suicidality, substance use and having an adult other than one's parents to seek help from (protective factors), and the control variables added to the model were age, gender and race.

Using IBM SPSS software standard version 24.0 and a sample size n = 45,479, the following results were obtained. For RQ1, there was a statistically significant association with a $p^{***} < 0.001$ between being bullied and binge drinking in high school youths in Montgomery County Maryland controlling for age, gender and race. The direction of this association was positive, as any unit change in adolescents being bullied was associated with 0.4 change in direction of binge drinking. For RQ2, there was a

statistically significant association with a *p*** <0.001* for both considered suicide and made a suicide plan and binge drinking among high school youths in Montgomery County Maryland when age, gender and race were controlled for. The direction of this association was negative for both considered suicide and made suicide plans as any change in unit value was associated with a -0.781 and -0.319 respectively in direction of binge drinking. For RQ3, there was statistically significant association with *p*** <0.001* for both marijuana use and synthetic marijuana use and binge drinking among high school youths in Montgomery County Maryland when age, gender and race were controlled for. The direction of this association was positive for both marijuana and synthetic marijuana as any change in unit value was associated with a 2.684 and 1.203 respectively in direction of binge drinking. For RQ4, there was a statistically significant association with *p*** <0.001* and *p = 0.006* for both having an adult other than their parents to talk to and having a teacher or an adult at school to talk to respectively and binge drinking in high school youths in Montgomery County Maryland when age, gender and race were controlled for. The direction of this association was negative for both having an adult other than their parents to talk to, and having a teacher or an adult at school to talk to as any change in unit value was associated with a negative change of -0.242 and -0.097, respectively in direction of binge drinking. For RQ5, there was a statistically significant association between binge drinking and the combination of being bullied, suicidality, substance use and having an adult other than one's parents to seek help from (protective factors) in high school youths in Montgomery County Maryland

when age, gender and race were controlled for. The measures considered suicide, marijuana use and synthetic marijuana use were most significant with all having same values of $p^{***} < 0.001$. Made a suicide plan and having a teacher or an adult to talk to at school followed next with significant values of $p = 0.001$ and being bullied with a significant value of $p = 0.023$. Having an adult other than your parent to talk to was not statistically significant with a $p = 0.224$. For beta values, being bullied and suicidality were associated with negative directions, while substance use and protective factors were associated with positive directions. Substance use specifically marijuana use had the highest change in direction per unit value with a beta value of 2.588 followed by synthetic marijuana with a beta value of 0.984 while suicidality, specifically the measure considered suicide had the least (most negative) change in direction with a beta value of -0.411 followed by made a suicide plan with a betta value of -0.228. Based on this data analysis, the null hypothesis was rejected for all research questions, and in chapter five the interpretation of findings, limitations to the study, recommendations as well as social change implications are discussed.

Chapter 5: Discussion, Conclusions, and Recommendations

The purpose of this dissertation was to examine antecedents of binge drinking in adolescents in a racially diverse community (Montgomery County, Maryland). The approach for this study was quantitative, and secondary data used were obtained from the CDC's YRBSS. Limited studies have been done on adolescent binge drinking in racially diverse populations (Reeb et al., 2015; Salas-Wright et al., 2014). The objective was to determine if similar antecedents of binge drinking that exist in adolescents on national platform studies also exist for this sample population, and if there are understudied or uncovered antecedents in this sample population. The variables studied were being bullied, suicidality, substance use, and protective factors. A binary logistic regression was used to examine this association. Results of the statistical analysis indicated that being bullied, suicidality, substance use, and protective factors are predictors of binge drinking in adolescents when controlling for age, gender, and race.

Interpretation of the Findings

The findings from this study were consistent with other studies as well as the distribution of males and females in the sample. The proportion of males to females who participated in the survey was similar and consistent with that of the state of Maryland and the entire United States. The percentage of males to females in this study was 48.8% females to 51.2% males. In the entire state of Maryland for 2015, there were 49.2% females and 50.8% males (MDHMH, 2016), consistent with that of the United States

with 48.7% females and 51.3% males (Kann et al., 2016). Racial/ethnic diversity was different for this population in comparison to that of the state and entire United States. Using 2014 nationwide population data, the United States Department of Health and Human Services (2017) reported that the U.S. adolescent distribution was 54.1% Whites, 14.0% Blacks, and 22.8% Hispanics. Surveillance summaries for the Morbidity and Mortality Weekly Report noted race for the state of Maryland as Whites 41.9%, Blacks 34.7%, Hispanics 12.8%, and Other 10.5% (as cited in Kann et al., 2016). Maryland YTRBS 2014 indicated adolescents in high school distribution for Montgomery County, Maryland as 32.6% White, 22.3% Black, and 26.6% Hispanic. This racial difference was expected for this population sample, which is why I selected this study sample.

RQ1 was as follows: What is the association between being bullied and binge drinking among high school youths in Montgomery County, Maryland controlling for age, gender, and race? A statistically significant association was seen between being bullied and binge drinking in adolescents for this sample population. This association was more predominant between 14, 15 and 16year olds. Valdebenito et al. (2015) indicated similar results of which the association of being bullied and alcohol use had an effect size of 1.79, similar to my study, which had an effect size of 1.49. However, the race variable was not analyzed, and I attempted to fill this gap as acknowledged by Valdebenito et al. (2015). Similar results for RQ1 were seen by Hertz et al. (2015) and Radliff et al. (2012) in which an association was seen between victims of bullying and binge drinking in adolescents. Hertz et al. did not predict binge drinking with the race variable; however,

they did analyze being bullied and race for their sample. This study extends knowledge in the field in terms of race in that no literature reviewed addressed the association in different race categories. When race was added to the model of binge drinking and being bullied, Asians and Blacks reported being most likely binge drink while Whites and Indians/Alaskan natives reported to be least likely to binge drink.

RQ2 was as follows: What is the association between suicidality and binge drinking among high school youths in Montgomery County, Maryland controlling for age, gender, and race? The two measures used to guide the analysis were considered suicide and making a suicide plan. There was a statistically significant association between suicidality and binge drinking in adolescents in Montgomery County. However, for this sample population, adolescents who considered suicide or made suicide plans were less likely to engage in binge drinking than adolescents who were not suicidal. There is a difference in outcomes of studies relating to suicidality and binge drinking because of the complex nature relating to demographics and cultural factors, although most researchers have argued that suicidality leads to adolescent binge drinking (Wilkinson et al., 2016). The results from this study were inconsistent with Gonzalez and Howell (2012), McManama et al. (2014), Wilkinson et al. (2016) who all indicated suicidality is a strong predictor of binge drinking as adolescents drink to cope with suicidal feelings. Some researchers, including Valdebenito et al. (2015), have proposed that being Black may be a protective factor in the association between suicidality and binge drinking in adolescents (as cited in Evans, 2014; Wang et al., 2013). Tomek et al.

(2015) acknowledged a gap in studies that included racially diverse populations, and I attempted to fill that gap. In this study, adolescents who considered suicide were less likely to engage in binge drinking than those who did not consider suicide. Similarly, adolescents who made suicide plans were less likely to engage in binge drinking than those who did not make suicide plans.

RQ3 was as follows: What is the association between substance use and binge drinking among high school youths in Montgomery County, Maryland controlling for age, gender, and race? The measures used to guide the analysis were marijuana use and if synthetic marijuana was used as well as the number of times. The results of this study were consistent with other studies by Haberstick et al. (2014) and Nelson et al. (2015), who indicated that substance use was a predictor of binge drinking. Haberstick et al., found similar results with gender in which rates of alcohol abuse in the presence of cannabis were higher among males than females. Whites and Native Americans had a higher alcohol use than other races (Haberstick et al., 2014). Haberstick et al.'s study was based on a national platform, and other individual races were not identified, a gap that I attempted to fill. In this dissertation, I examined the associations of the predictors of binge drinking as well in the racial categories: Blacks, Hispanics, Asians, Native Hawaiians, multiple races as well as Non-Hispanic Whites and Native Americans.

RQ4 was as follows: What is the association between having an adult other than a parent to seek help from (protective factors) and binge drinking in high school youths in Montgomery County, Maryland controlling for age, gender, and race? The measures for

protective factors were having an adult other than a parent to talk to outside of school and having a teacher or adult at school to talk to about a problem. There was a statistically significant negative association between protective factors and binge drinking in adolescents. This implies that the absence of protective factors increase risk in binge drinking. The results of this study are consistent with a study by Schwinn et al. (2014), who examined peer and parental influences on adolescent alcohol consumption. Similar results were also seen by Jacobs et al. (2016), who studied the associations between family structure, parent and sibling alcohol use, perceived peer norms toward consumption, and alcohol use in a sample of adolescents. In both studies, there was a negative association between parent/parental influence and binge drinking in adolescents. Shakya et al. (2012) also showed similar results in which an authoritative adolescent's mother's behavior had an influence on the adolescent's friends such that it reduced their likely hood of binge drinking by 39%. Indicating that protective factors are negatively associated with binge drinking, the absence of protective factors implies risk in binge drinking. Shakya et al. used a national representative sample. However, their network pattern could not be generalized, and hence the study cannot be generalized. Similarly, the race variable was absent in the analysis (Shakya et al., 2012). However, this gap is filled by examining the race variable, and my study could be generalized to similar populations. In this dissertation, I identified individual races, and when race was added to the model of protective factors, Asians were most likely to be affected by this protective factor, and the least likely were Whites.

RQ5 was as follows: What is the association between being bullied, suicidality, substance use and in having an adult other than your parent to seek help from (protective factors) and binge drinking among high school youths in Montgomery County Maryland controlling for age, gender and race? There was a statistically significant association between binge drinking and the independent variables being bullied, suicidality and substance use. In the combined model, only the variable protective factors, specifically having an adult other than a parent to talk to was not significant (p = 0.224) while having an adult or teacher to talk to at school was significant. Similar studies that have examined multiple predictors (such as type of neighborhood, victims of bullying, bully perpetrators, substance use, part time job status, deviant behaviors, peers, parental influence and substance use), of binge drinking exist, but these studies have not examined the same risk factors in one study as seen in this dissertation including identifying various race categories and explaining the correlation of race in binge drinking. However, studies examining multiple risk factors have shown an association between risk factors and binge drinking in adolescents (Haberstick et al., 2014; Leeman et al., 2014, Nelson et al., 2015; and Patrick et al., 2013).

Interpretations in the Context of Theoretical Framework

The SEM was identified as the theoretical framework used for this study. The SEM was chosen because describes both personal and contextual factors that influence behavior (Golden and Earp, 2012). The multifaceted nature of adolescent binge drinking makes the theory very appropriate. According to Stokols (1996), targeting all levels of

influence in interventions may be practically impossible hence; health promotion programs should aim to include at least two levels of influence. The levels of influence as identified and tested by the research questions a described below.

The first level of influence is the individual level, which consists of personal factors that may influence binge drinking such as knowledge, age, gender, behavior, personal values and skills (Connell et al., 2010; McLeroy et al., 1988). RQ1 (being bullied), RQ2 (suicidality), RQ3 (substance use) are all tested at this level. Since the null hypothesis was rejected for these RQs, intervention programs using the SEM for adolescent binge drinking in similar populations should pay attention to predictors relating to the individual level. For RQ4, the second level is the interpersonal level which deals with the culture of the community, formal and informal social networks and support systems including associations such as those with family members and friends is tested (McLeroy et al., 1998). The null hypothesis was also rejected. Thus, results indicated that intervention programs using the SEM as a guide for this population should also focus on interpersonal factors. The other levels of the SEM were not tested for this dissertation and are recommended for further research.

Limitations

The results of this dissertation extend the knowledge of adolescent binge drinking. However, a few limitations have been identified with this study. Data obtained for this dissertation was through a cross-sectional design, and as such, this dissertation fails to properly conclude if observed risk factors are the actual cause of binge drinking in

adolescents in this sample population. Only currently enrolled in high school adolescents were surveyed; implying data may not be a true representation of all adolescents in this age group. Similarly, questions on being bullied and suicidality were asked for over a 12-month period and may be subjected to recall bias. Lifetime questions were asked on substance use which also may not be properly recalled. In addition, adolescents may not properly recall number of drinks they had for binge drinking qualifications. This study was limited to questions on the survey implying that not all the levels of the SEM could be fully addressed.

Recommendations

Based on this study, a couple of recommendations have been identified. Due to the fact that risk factors identified were predictive of binge drinking for this sample population, I would recommend that more research be done on adolescent binge drinking in similar populations with high racial diversity since very few studies have recruited similar sample populations. Secondly, studies should identify age at exposure of the individual risk factors as well as binge drinking for this sample population. This may help in pathway analysis in risk factors which could be significant in intervention programs. Based on the combined model of all independent variables, covariates and binge drinking (RQ5), substance use, specifically marijuana use, had the highest effect size (13.3) compared to the other independent variables and Native Hawaiians had the highest effect size (2.1) compared to other races for this variable in this combined model. This was seconded by Black with an effect size of 1.9. Hence, I would recommend that

intervention programs specific to marijuana and binge drinking in similar population target Native Hawaiians and Black adolescents. Black adolescents because race distribution for this sample population shows Blacks at 22.3% while Native Hawaiians have 0.5%.

Implications

The implications of the results of this study could be seen in different dimensions. Firstly parents, teachers, other adults and even the adolescents themselves should be made aware of the risk factors they are more prone to based on racial evidence from this dissertation. This is important since research has shown that early prevention and intervention in adolescent binge drinking in key in preventing alcohol dependence (Marshal, 2014; Harding et al., 2016). Based on effect size from this dissertation study, public health professionals can identify which racial groups are more at risks and allocate resources more efficiently. In addition, local communities with similar population characteristics can apply intervention programs based on the results of this study, especially by race, which has not been a major construct in determinants of adolescent binge drinking (Evans, 2014, Sangalang et al., 2016). For this sample population, 14 or 15 year olds were more at risk when covariates were added to the model of each independent variable. When covariates were added, in terms of race, no single race was consistent with having the highest effect size. However, as seen in the reports from the individual models containing the covariates, independent variable and binge drinking (RQ1 through RQ4), Asians seemed to have the highest risk. This implies that social

changes for similar populations; if possible, target 14 or 15-year olds and Asians for more effective and efficient interventions. This could be significant not only to the local communities but also to the State and policy makers who could be proactive in making policy changes. Based on the SEM, organizations could benefit as institutions such as schools with structures and processes that target risk factors such as bullying. Since adolescents spend a good portion of their day in these institutions such as schools, interventions could not only be applied but at greater scale because of population size than in environments with limited capacity.

Some detrimental effects of alcohol use in adolescents include shrinking of the brain leading to mental health and neuro-cognitive issues that are most likely to continue to adulthood, liver disease, abuse of other drugs, accidental injuries and death (CDC, 2016; Marshall, 2014; Woo et al., 2017). It is also associated with absenteeism in schools and drop outs. Being able to statistically identify factors influencing youth alcohol consumption could lead to improved health in later years, improved school attendance and higher grades leading to more graduations and higher standards of living; it could lead to reduced alcohol related accidents, injury and death, improved health and reduced rates of violence. As indicated above, the implications for social change from this study could be personal as well as at the community level.

Conclusion

Through this dissertation I attempted to fill the gap of predictors (being bullied, suicidality, substance use and protective factors) of binge drinking in adolescents in a

racially diverse community. Several studies have been done on adolescent binge drinking but none have studied multiple risk factors in racially diverse communities. This is important as nationwide platforms may mask antecedents of binge drinking for this population that may be very much needed for successful targeted intervention programs in racially diverse communities. Five RQs were asked to guide this study and the null hypothesis was rejected for all RQs at a significance level of $p<0.05$.

In examining risk factors in adolescent binge drinking for this sample population, intervention programs can be effectively and efficiently implemented, as well as applied to similar populations. Risk factors could be better explained to adolescents so they understand their susceptibility and apply strategies to prevent consequences of exposure. This study adds to the knowledge of binge drinking in racially diverse populations that could guide policy makers when dealing with racially diverse communities. The study therefore could aid in prevention of alcohol consumption and binge drinking at the personal level, and bring awareness at the interpersonal level, institutional, organizational, as well as policy levels.

As indicated throughout this study, binge drinking is prevalent in adolescents and the effects of binge drinking on adolescents are extensive and severe. Identifying and understanding risk factors of binge drinking in adolescents in racially diverse populations is important to enable targeted interventions in these communities. As such, it is hoped that these targeted interventions could be successful and the prevalence of binge drinking and detrimental effects could be reduced. References

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Appendix A: Title of Appendix