Examining the Relationship Between Mental Health Status and Alcohol Consumption Among College Aged Adults

by

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Abstract

Mental health disorders and alcohol use have been identified as public health issues. Research indicates that young adults have relatively high rates of mental health disorders and alcohol use. The main purpose of this study is to examine the relationship between mental health status and alcohol consumption among college-aged adults living in California, using the 2016 Behavioral Risk Factor Surveillance System (BRFSS). It was also examined whether race/ethnicity, gender, and income variables affect the relationship. A random sample of 1,087 male and female college-aged adults living in California was used. Using a cross-sectional design, participants completed a phone survey containing demographics and health questions. The dependent variable was alcohol consumption, and the independent variables were race/ethnicity, gender, income, and mental health. A Chi-Square test of independence and a binary logistic regression model were used to answer the research questions. The result of the study indicated that there is no significant relationship between mental health status and alcohol consumption among college-aged adults. Also, race/ethnicity, gender, and income did not predict or modify the relationship between alcohol consumption and mental health.

Key words: alcohol use, mental health status, college-aged adults, BRFSS, logistic regression

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Review of Literature

Introduction

The Digest of Education Statistics Data reveals that college student enrollment has increased (NCES, 2012). In 2010, there were nearly 21 million young adults enrolled in college; a 73% increase since 1980 (NCES, 2012). Furthermore, attending college helps students develop into mature, responsible, and independent adults (Geisner, Mallett & Kilmer, 2012). However, the college years are often associated with increased rates of alcohol consumption, depression, and a variety of other mental health problems among college-aged adults (Murphy, Hoyme, Colby, & Borsari, 2006). A national survey of counseling center directors found that the most common psychological disorders reported among college students were anxiety, depression, eating disorders, alcohol abuse, self-injury, and suicidal ideation (Gallagher, 2006). Approximately 79,000 people die annually from alcohol consumption (Bouchery, 2011). In 2005, approximately 1,825 university students between the ages of 18 and 24 died from alcohol-related, unintentional injuries involving motor vehicle accidents (Hingson, 2009). The estimated economic cost of extreme alcohol drinking was $223.5 billion in 2006 (Bouchery, 2011). This includes the expenses associated with disease and injury, property damage from fire and motor vehicle accidents, alcohol-related crimes, and lost productivity (Bouchery, 2011).

Mental health problems in early adulthood are linked with academic failure (Kessler et al., 1995), health-risk behaviors (Arbour-Nicitopoulos et al., 2012), social impairment, and difficulties with relationships (Druss et al., 2009). Furthermore, there are associations of early-onset mental health disorders with significant reductions in subsequent educational attainment (Mojtabai et al., 2015). Students report feeling academic stress at predictable times every semester. Sources of university stress occur from taking, dropping, and studying for exams,

grade competition, and a large volume of content to master in a short time (Gill et al., 2010. When stress becomes extreme, students undergo physical and psychological harm (Prabu, 2015). Anxiety and depression among college students have been shown to negatively affect their academic performance and contribute to learning difficulties (Dyrbye et al., 2006). Kitzrow (2003) noted that 28% of first-year college students reported being overwhelmed and 8% were depressed. Kitzrow (2003) further explained that these mental health problems could affect students' academic performance.

Research on academic performance and substance use, such as alcohol, finds that university students who abuse alcohol experience academic failure and develop alcohol dependence (Geisner et al., 2004). Data from the National Institute on Alcohol Abuse and Alcoholism indicated that around 1 in 4 college students reported academic consequences from alcohol drinking, including missing class, performing poorly on papers, falling in class, and earning lower grades overall (NIAAA, 2015).

Alcohol Consumption Among College Students

Alcohol use is broadly reported among college students (Brandão, 2011; Kim et al., 2009). Some studies show that college students are at a higher risk for alcohol consumption compared to their same-age peers who do not attend college (Bewick et al. 2008). The Centers for Disease Control and Prevention ([CDC] 2012) notes that having at least six regular drinks per occasion is viewed as binge drinking, and college students are also more prone to binge drink than their non-college attending peers (Quinn et al., 2011). Recent research suggests that binge drinking may affect brain functioning in early youths (CDC, 2012). Frequent binge drinking is associated with many health problems and risky behaviors, such as engaging in unprotected sex, intentional and unintentional injuries, and liver disease (CDC, 2012). The university environment

provides a unique social context that often promotes excessive drinking. For instance, alcohol advertising, alcohol-related events at universities, and/or pressures to belong compounded by the new freedoms at college and peer pressure all can create environments that promote drinking (Tembo et al., 2017).

Singleton and Wolfston (2009) examined the relationship between alcohol use and sleep, alcohol use and academic performance, and sleep and academic performance among college students. They concluded that students who drink more alcohol maintain poor sleep patterns, which negatively affects academic performance (Singleton et al., 2009). Age is also important as younger university students have a higher rate of alcohol use (Ford, Jason, & Arrastia, 2008). Furthermore, peer relationships are consistently linked to alcohol use among college students (Borsari & Carey, 2006). Research suggests that peers have a significant influence on alcohol consumption, especially if the peers consume alcohol (Borsari & Carey, 2006).

Gender and Alcohol Use

Many studies have explored the gender differences in alcohol consumption. Males tend to binge drink twice as frequently as females (CDC, 2012). Clarke et al. (2013) conducted a study that examined the relationship between alcohol use and alcohol-related negative consequences among male and female college students. They found that women consumed less alcohol than men (Clarke et al., 2013). The study further suggests that women who drank four drinks were significantly more likely to experience alcohol-related problems than men who drank five drinks in a row (Clarke et al., 2013). Women who usually consumed five drinks were more likely to miss a class than were men who consumed five drinks (Clarke et al., 2013). A similar study conducted by White et al. (2006) found that male students were more likely to engage in drinking on college campuses than female students and males consumed more alcohol than

females in a two-week time frame. This difference could be due to physical and social factors (Smarandescu et al., 2014). Generally, males have a lower fat to muscle percentage and usually, weigh more than females. Thus, more alcohol is required to achieve an intoxication effect in males (Smarandescu., 2014). Male college students are at a higher risk for drinking and driving, homicides while intoxicated, and accidents after alcohol consumption than female students (Delker et al., 2016). For males alcohol drinking is a manly activity, and society has more acceptance for this behavior (Smarandescu et al., 2014). Whereas, socially, females are expected to morally abstain from drinking (Keyes, Grant, & Hasin, 2008).

Research conducted by Talbott et al. (2008) examined drinking likelihood, alcohol problems, and peer influence in first-year college students who stayed on campus. They noticed that male students were more likely than females to allow their alcohol consumption in social settings to be influenced by their peers (Talbott, 2008). Svensson (2003) found evidence of higher levels of parental monitoring for females than males. Since males are monitored less, they are likely to have more contact with peers, some of whom may engage in deviant behaviors, such as excessive alcohol consumption (Svensson, 2003).

Gender is an important correlate of both alcohol use and alcohol-related outcomes among college students. Male college students typically engage in heavier episodic and daily drinking than female students. It is necessary to understand the roles of gender and reasons that contribute to increased alcohol consumption among male college students compared to female college students.

Income and Alcohol Use

Income seems to be an important factor in alcohol use. Previous research has shown that lower-income students are at a higher risk of engaging in heavy, hazardous drinking (Huckle et

al., 2010). Studies have shown that youth who live in areas of the high unemployment report poorer health behaviors. For example, youth who reside in areas of higher unemployment use alcohol at a higher rate than their more affluent counterparts (Spooner et al., 2000). Lower socioeconomic groups also reported more frequency drinking (CDC, 2012). A study by Pollack et al. (2005) showed that young adults from low-income neighborhoods had substantially higher levels of alcohol consumption than youth from other neighborhoods. Also they suggested that the social and cultural climate in the lower income neighborhoods may make alcohol consumption more acceptable (Pollack, et al., 2005). Furthermore, Goodman, and Huang (2003) found that having a low socio-economic status (SES) was associated with higher alcohol, cigarette, and cocaine use in adulthood. Further, lower household income and parental education were associated with greater adulthood depression (Goodman et al., 2003). Reinherz and colleagues (2000) also found that low family SES and larger family sizes were linked with the increased likelihood of substance abuse disorders in early adulthood.

Race/Ethnicity Differences in Alcohol Use

When examining the complex issues associated with college student alcohol use, Siebert, Wilke, Delba, Smith, and Howell (2003) suggested addressing race and ethnicity as factors in a student's choice to drink or misuse alcohol. It is necessary to understand the factors that influence a student's decision to participate in high-risk drinking behaviors (Borsati et al., 2007). Research has suggested that the most prevalent influential factors of alcohol use are moderators and social and environmental factors (Borsati et al., 2007). Borsari et al. conducted a literature review and found six moderators of alcohol use in college, including gender, race, religiosity, sensation seeking, parental influence, and pre-college alcohol use (Borsati et al., 2007). Multiple studies indicate that White students consume alcohol the most frequently, followed by Hispanic

students, Asian students, and African-American students (Borsati et al., 2007). According to a national research conducted by the Core Institute, of the 40,000 college and university students surveyed, the largest proportion of alcohol abstainers were Asian/Pacific Islander and Black respondents. White college students reported drinking, on average, twice the number of drinks per week as non-Whites (Higher Education Center for Alcohol and Other Drug Abuse and Violence Prevention, 2001). Paschall and Flewelling (2002) replied that traditional values and religion more heavily influence Blacks. On the other hand, White college students use alcohol to facilitate the alcohol expectancy of engaging in behavior they would not ordinarily do (Paschall & Flewelling, 2002). White students are more influenced by their roommates and social settings than Black students (Siebeti et al., 2003).

It is necessary to examine racial difference because colleges are becoming more racially diverse, and there is a national concern regarding the high rates of heavy drinking and negative alcohol-related consequences among college students (Ham & Hope, 2003). A few studies have examined race, alcohol consumption, and alcohol-related consequences among college students. These studies have found that White college students, compared with Black college students, experienced more alcohol-related problems (e.g., interpersonal conflict and poor class attendance) (Siebert et al., 2003).

Skidmore et al. (2012) examined the relationships between race and alcohol-related problems and between gender and alcohol-related problems. The results revealed that European American college students experienced significantly more alcohol-related problems than African American college students and that female students encountered more alcohol-related problems than male students (Skidmore et al., 2012). They also suggested that experiencing alcohol-related problems is normative for European American students (Skidmore et al., 2012). Furthermore,

African American students engaged in protective behaviors (e.g., eating before drinking, shifting between an alcoholic and non-alcoholic drink) more often than European American students (Skidmore et al., 2012). Additionally, family attitudes toward alcohol is another important protective factor for African American college students (Skidmore et al., 2012). African American parents believe they have more influence over their children than European American parents (Skidmore et al., 2012).

Mental Health and College Students

Mental health problems, such as depression, stress, and anxiety, are common among college students worldwide (NIMH, 2013). The typical age of the college student population ranges from 18 to 24; this age range is also when the onset of several mental disorders begin to occur (Kessler, 2007). Evidence indicates that mental disorders are becoming more diverse and severe among college students in the United States (Saleem, 2014). According to the 2006 National Survey of Counseling Centers, 92% of college directors assume that the number of college students with critical psychological problems has increased in recent years (Gallagher, 2006). Blanco et al. (2008) examined approximately 2,188 college students age 18-24 and found almost half of the college students met DSM-IV criteria for having a psychiatric disorder (Blanco et al., 2008). One study examined over 14,000 students across 26 U.S. college campuses and found that nearly a third of the sample (32%) had mental health concerns in the past year (Eisenberg et al., 2011). In the 2008 National College Health Assessment approximately 1 in 10 undergraduates reported “seriously considering attempting suicide” and more than 1 in 3 undergraduates reported “feeling so depressed it was difficult to function” (ACHA, 2008). Furthermore, according to a study done in 2006 of 26,000 students from 70 universities and

colleges, around 6% of undergraduates and 4% of graduate students reported having seriously considered suicide in the past 12 months (Grant et al., 2003).

College students are at-risk of developing psychological disorders and experiencing mental health problems given the unique set of challenges they face (Pedrelli, 2015). College students experience internal and external pressures as they adjust to a new social environment and financial and academic demands in preparing for their future as professionals (Kharjana, 2014). Research has found that there are specific risk factors that university students face that may increase problems with their mental health status (Hunt & Eisenberg, 2010). University students face stressors such as academic overload, competition against peers, continual pressure to succeed, financial hardship, and concerns about their future (Vazquez et al., 2012). College students have the highest associated risks for mental health disorders as 40% binge drink and 16.6% meet the diagnostic criteria for alcohol dependency (Substance Abuse and Mental Health Services Administration, 2014).

Tembo et al. (2017) investigated the association between mental health problems, levels of drinking, and academic performance among college students aged 18 to 24 years. They found that students who drank alcohol at hazardous levels were 1.2 times more likely to report psychological distress than students with lower levels of alcohol use (Tembo et al., 2017). Also, being late for class, missing classes, inability to concentrate in class, and inability to complete assignments independently predicted for moderate or hazardous alcohol consumption (Tembo et al., 2017). In addition, high levels of alcohol consumption are associated with poor academic performance and mental health outcomes among college students (Tembo et al., 2017). College students may be influenced by a variety of environmental and lifestyle changes (Tembo et al., 2017).

Gender and Mental Health

Male undergraduates are at a greater risk for suicide (Mackenzie et al., 2011); whereas female undergraduates are more prone to depression and anxiety (Eisenberg et al., 2007). A survey of the mental health needs of 939 students from a midwestern university found that 18% of females and 9% of males reported being depressed and similar female to male ratios existed for anxiety (F = 7%, M = 4%) (Soet & Sevig, 2006). These data suggest that about twice as many females as males have these disorders (Soet & Sevig, 2006). A large-scale study conducted at a university reported that female students with a low income and non-heterosexual students had the greatest rates of mental health issues (Said et al., 2013).

Economic and social policies that cause disruptive changes to income, employment, and social capital that cannot be controlled or avoided significantly increase gender inequality and the rate of common psychological diseases (World Health Organization [WHO], 2018). Generally, depression, psychological distress, anxiety, and sexual violence affect women to a greater extent than men. Pressures created by their multiple roles, gender discrimination, and associated factors of poverty, overwork, domestic violence, and sexual abuse combine to account for high rates of poor mental health among females (WHO, 2018). There is a positive association between the severity and frequency of social factors and the severity and frequency of mental health problems in women (WHO, 2018). Gender-specific risk factors for common mental disorders that disproportionately affect females include gender-based violence, socioeconomic disadvantage, and low income (WHO, 2018).

Income and Mental Health

University students from lower socioeconomic backgrounds are at a higher risk for depression and anxiety (Eisenberg et al., 2007). A constant finding in the medical literatures,

including psychiatric epidemiology, is that lower SES is associated with mental illness (Kessler et al., 2005). According to the Florida Council for Community Mental Health (2015), those with family income levels of less than $20,000 were more likely to experience severe mental illness (16.3%). Whereas the lowest instances of severe psychological disease were more likely to occur among those with high family income levels of $75,000 (6.4%) or more. Students who struggle financially also have significantly higher rates of mental health problems than those who do not report financial concerns (Eisenberg et al., 2007).

Indeed, research has explained that economic deprivation has a very negative impact on mental health (McLafferty, 2015). Many low-income students often have the added responsibility of caring for family or work commitments, which can lead to added stress (Osafo et al., 2015). The mental health implications of a low income can also be stress-related and be caused by financial strain, resulting in concerns about the future and negative cognitions associated with low-income-related social rank (Osafo et al., 2015).

Race/Ethnicity and Mental Health

According to statistics from the Substance Abuse and Mental Health Services Administration (SAMHSA), rates of mental disorders differ across race and ethnicity: 24.9% of people of two or more races, 22.7% of Asians, 19.0% of Whites, 16.8% of Blacks/African Americans, 15.3% of Hispanics, and 13.4% of American Indians/Alaska Natives report having any mental illness in the past year (SAMHSA, 2015). Many influences inform the disparate prevalence rates, including the genetic and epigenetic variants, geographic area, diet, family background, socio-cultural factors, and life stressors (American Psychological Association [APA], 2013). The last one is especially strong since stressful life events are a risk factor for

mental illnesses and being a racial or ethnic minority carries a unique set of stressors (APA, 2013).

Migration is the first stressor many minorities face (Office of the Surgeon General, 2001; Hirschman, 2013). Minorities who are not new immigrants still face cultural stress by being racially or ethnically different; they are at-risk of being discriminated against or not fitting in with the majority culture (Office of the Surgeon General, 2001). Racism and discrimination are obvious stressors that could worsen mental health (Office of the Surgeon General, 2001). Young adults (e.g., college students) who are second generation immigrants fight to accommodate their parents' cultures with their own identities as Americans (Hirschman, 2013).

Compared with other ethnic groups, Asian Americans have higher levels of psychological distress but lower rates of mental health treatment utilization (Eisenberg and Chung, 2012). Furthermore, depressive symptoms are connected to alcohol behaviors in this population (Iwamoto, Liu, & McCoy, 2011). Data shows increases in heavy alcohol use and problems among Asian college students (Grant et al., 2004). Current research has documented that Asians who do drink alcohol show trajectories of increasing heavy episodic drinking (HED) and alcohol problems during their college years (Iwamoto et al., 2010).

Conclusion

Many people drink to help deal with their anxiety and depressive thoughts (Sinha, 2008). Mental health is one of the most critical risk factors documented for alcohol and substance abuse (Tembo, 2017). Many mental health professionals believe that there is a significant relationship between alcohol use, anxiety disorders, and depressive disorders among college students (Tembo et al., 2017). Additionally, studies have found gender moderates the relationship between alcohol consumption and a depressed mood. For example, in a study conducted by Cranford, Eisenberg,

and Serras (2017) anxiety was positively associated with higher odds of frequent binge drinking and was stronger for males than females. They suggested that men may be more likely than women to rely on alcohol consumption as a means of reducing anxiety, in part because they have more positive alcohol-related expectancies (Cranford et al., 2017). Furthermore, Geisner et al. (2004) found that the relationship between psychological distress and alcohol consumption was significantly stronger for male students than for females. Men who were more distressed had more alcohol-related problems than women who showed the same levels of distress (Geisner et al., 2004). The study implied that males are more likely to cope with depression symptoms by drinking, ignoring the problem, and taking drugs, while females are more likely to take medication, confide in friends, or seek a doctor's help (Geisner et al., 2004). Substantial research has documented that there are racial/ethnic and gender differences in alcohol use and alcohol-related negative consequences (Alvanzo et al., 2011). Exploring the relationship between alcohol use, gender, income, and race/ethnicity among college-aged adults are important in light of what is known about mental health status and the social experiences that influence it.

Purpose of the Study

Mental health problems and alcohol consumption among university students can result in a regression in their academic achievements and impact their physical and mental health. This study may help researchers understand the potential influence mental health has on alcohol use among college-aged adults. The purpose of this study is to examine the relationship between gender, income, and race/ethnicity on alcohol use and mental health status. This will allow for the better tailoring of interventions, such as educational programs and medical care, as well as identify appropriate policies to address the issue among college-aged adults.

Research Question

The research questions for the study are:

1. Is alcohol consumption associated with one's mental health status?

2. Does race/ethnicity, gender, or income influence the relationship between mental health status and alcohol consumption?

Hypothesis

It is hypothesized that there is a relationship between mental health status and alcohol consumption. It is further hypothesized that the relationship between mental health status and alcohol consumption may be influenced by gender, income level, and race/ethnicity. The relationship between mental health status and alcohol consumption is expected to be higher for low-income, male, and White college-aged adults.

Method

Design

A cross-sectional design was used in this study. The data used in this study was from the 2016 Behavioral Risk Factor Surveillance System (BRFSS) dataset. The BRFSS dataset is a state-based telephone survey that involves information on many health issues, risk behaviors, use of preventive services, demographics, and chronic conditions for adults who live in the United states and selected US territories (CDC, 2017).

Participants

The 2016 BRFSS dataset is comprised of more than 400,000 participants; 11,393 of the respondents reported they lived in the State of California. For this study, a sample of 1,087 California adults, between the ages of 18 and 24 years of age, was used. The study participants consisted of both male and female adults. Using G*Power Software, Version 3.1.9.2, a medium effect size of .3, an alpha level of .05, and a power of 80% was selected to estimate the minimum required sample size of 143 (Faul et al., 2007). The selected sample used exceeds the required minimum sample size.

Procedures

The 2016 BRFSS is a national dataset (CDC, 2017). The BRFSS data collection was instituted by the CDC to collect data on health risk behaviors, preventive health practices, and health care access for injuries and chronic diseases (CDC, 2017). The BRFSS data is gathered from landline and cell phone interviews (CDC, 2017). Telephone numbers were randomly selected by region in each state (CDC, 2017). Data was collected monthly in all fifty states, Washington, D.C., Puerto Rico, the Virgin Islands, and Guam (CDC, 2017). Trained

interviewers administer identical questionnaires to non-institutionalized US adults who had been selected through random-digit dialing (CDC, 2017).

Each year, a standardized questionnaire is designed to collect the BRFSS data (CDC, 2017). The questionnaire consists of three sections: a core component, optional questions, and state added questions (CDC, 2017). Core questions are asked by all states, while the optional section includes questions on specific topics and is included if the state desires (CDC, 2017). Survey participants complete the questionnaire and are assured of the confidentiality of their responses.

Data Analysis

This study analyzed the responses of an age-selected sample of 1,087 adults, ages 18-24 years, living in the California. The 2016 BRFSS dataset was downloaded into the Statistical Package for Social Sciences (SPSS) Version 25.0. The demographic characteristics were summarized using frequencies and percentages. Frequencies and descriptive data were evaluated to determine normality and identify outlying data within the dataset.

A Chi-Square test of independence was used to answer the first research question, "Is alcohol consumption associated with one's mental health status?" A binary logistic regression was used to answer the second research question, "Does race/ethnicity, gender, or income influence the relationship between mental health status and alcohol consumption?" Binary logistic regression assessed the influence of gender, race/ethnicity, and income on mental health status and alcohol consumption. Two models were produced. The first model assessed the relationship between mental health status and alcohol consumption, and the second model explored whether gender, race/ethnicity, or income influences that relationship.

Independent Variables

The independent variables include mental health status, gender, income, and race/ethnicity. The first independent variable is mental health status and was measured by the question, "Now thinking about your mental health, which includes stress, depression, and problems with emotions, during the past 30 days when was your mental health not good?" Mental health status was recorded in the 2016 BRFSS dataset into four levels: "Zero days when mental health not good," "1-13 days when mental health not good," "14+ days when mental health not good," and "9 (Refused, Don't know, Missing)." Then the mental health variable response was recoded into three levels: "Good (0-13 days when mental health not good)," "Poor (14+ days when mental health not good)," and "9 (Refused, Don't know, Missing)."

The second independent variable is gender and was measured by the question, "What is your sex?" Gender was recorded as "1 (Male)," "2 (Female)," and "9 (Refused)."

The third independent variable is income and was measured by the question, "What is your annual household income?" The income recorded in the 2016 BRFSS dataset as "1 (Less than $10,000)," "2 (Less than $15,000)," "3 (Less than $20,000)," "4 (Less than $25,000)," "5 (Less than $35,000)," "6 (Less than $50,000)," "7 (Less than $75,000)," "8 ($75,000 or more)," and "99 (Refused, Don't know, Missing)," Then income was recoded into two groups, low income and high income (Cochran, 2017). The newly recoded variable was in line with Federal Poverty Guidelines which included the original categorical income variable as well as the household size variable to create a new variable called "Income." To construct this newly recoded variable, the number of children in the household was summed with the number of the adults in the household to form one variable called "Total number of persons in the household." Then, a new income variable was created based on examining the total number of persons in the household and the income level. For instance, according to the federal poverty guidelines, a

family of four with a household income of $48,600 and below is considered “low income” whereas income at $56,880 or above is considered “High income.” This methodology was used to recode income levels for all BRFSS respondents used in this study.

The fourth independent variable is race/ethnicity and was measured by the question, “Which one or more of the following would you say is your race?” Race/ethnicity was recorded by the 2016 BRFSS dataset in to six groups: “1 (White),” “2 (Black/African American),” “3 (Asian),” “4 (Hispanic),” “5 (Other Race),” and “9 (Refused, Don’t know, Not sure).”

Dependent Variable

The dependent variable is alcohol consumption and was measured using a calculated variable for binge drinkers. Males having five or more drinks on one occasion or females having four or more drinks on one occasion were documented as “1 (No—not a binge drinker),” “2 (Yes—a binge drinker),” and “9 (Refused, Don’t know, Missing).”

Research Ethics

A publicly available, de-identified dataset was used in this study. The Institutional Review Board (IRB) at California Baptist University approved this project under exempt status on April 9, 2018 (see Appendix A).

Research Findings

It was hypothesized that there is a relationship between mental health status and alcohol consumption. Frequencies, descriptive statistics, and a Chi-Square of independence were calculated to test the hypothesis. The sample used in this study included 1,087 college age adult respondents to the 2016 Behavioral Risk Factor Surveillance System (BRFSS). As shown in Table 1, the majority of the BRFSS respondents were male (56.3%) with most classifying themselves as White (32.8 %), Black (4.5%), Asian (14.6%), Hispanic (41.3%), and Other race (6.2%). The average age of the BRFSS respondents was 21 years old. Most (68%) of the survey respondents reported no binge drinking and 87% reported being in "good mental health."

In the first research question, "is alcohol consumption associated with one's mental health status?" a Chi-Square test of independence was performed to compare the frequency of alcohol consumption with mental health status. No significant relationship was found ($X^2(1) = 1.23$, $p = .267$). Mental health status was not significantly associated with alcohol consumption. Mental health status and alcohol consumption status among college-aged adults appear to be independent events (see Table 2).

Binary logistic regression was used to assess the influence of gender, race/ethnicity, and income on mental health status and alcohol consumption. Two models were produced. The first model assessed the relationship between mental health status and alcohol consumption and the second model explored whether gender, race/ethnicity, or income influences that relationship. In the first model, there was no significant relationship between mental health status and alcohol consumption (X^2 (1) =1.197, $p = .274$). The findings indicate that the mental health status does not predict the extent to which college-aged adults engage in alcohol use ($p = .268$, $\beta = .790$). In the second model, there were also no significant relationships found (X^2 (7) =13.45, $p = .062$).

Race/ethnicity, gender, and income do not moderate or predict the relationship between mental health status and alcohol consumption (see Table 3). The second model shows no significant effect of race/ethnicity on alcohol consumption (p = .734). African American (p = .999, β = .001), Asian (p = .925, β = .919), Hispanic (p = .330, β =1.91), and Other Race (p =.739, β = 1.40) college-aged adults did not report significantly different alcohol use rates compared to White college-aged adults. In addition, there was no significant effect found for income and alcohol consumption (p = .483, β =.774). Upon further examination of the second model, gender (p =.022, β = .432) was a significant independent predictor of alcohol consumption, even if the model was not significant. The results indicate that females were 56.8% less likely to binge drink compared to male students.

Discussion

The purpose of this study was to examine the relationship between gender, income, and race/ethnicity on alcohol use and mental health status among college-aged adults aged 18 to 24 years. With regards to the first hypothesis, a relationship was expected between mental health status and alcohol consumption. Examining the relationship between mental health status and alcohol consumption is important because college years represents a transitional period where both high levels of mental health problems and alcohol consumption exist.

The results of this study indicate there is no relationship between mental health status and alcohol consumption ($p = .274$). More specifically, college-aged adults reporting good mental health were more likely to consume alcohol (85.6%) compared to those who report poor mental health. These results are incongruent with a study by Tembo and colleagues (2017) who found a significant relationship between alcohol use, academic performance, and mental health problems among college students aged 18-24 years. They found that psychological distress was significantly associated with harmful levels of alcohol use ($p < 0.001$). They further found that students who were drinking alcohol at hazardous levels were 1.2 times more to report psychological distress than those with lower levels of alcohol consumption (OR = 1.2; 95% CI = 1.1, 1.5) (Tembo et al., 2017).

One possible explanation for this discrepancy is perhaps that there are subsets of drinkers who may be more likely to drink following exposure to stress or mental health issues. Future research should seek to distinguish subsets of drinkers based on their drinking habits, motives for drinking, and sensitivity to the influence of environmental events on their drinking behavior. A large number of the participants (88.3%) in this study indicated that they did not use alcohol at all. Their responses could have been out of fear of reprisal. Participants may not have

remembered the accurate answers to particular questions or could have been influenced to answer in the same way as their friends. In addition, it is likely that the social interactions of this largely college-aged sample buffer potential psychological distress, which in turn enhances their mood and sense of well-being. Therefore, they may not handle their mental health problems by drinking (Piasecki et al., 2008).

With the second research question, it was hypothesized that the relationship between alcohol consumption and mental health status would be more prevalent among males, those of low-income, and White survey respondents. According to the analyses performed, neither gender, income, nor race/ethnicity were found to influence the relationship between mental health status and alcohol consumption. Although the overall regression model was not significant, gender (p =.022) appeared to significantly influence the relationship between mental health status and alcohol consumption with males having the higher rate of alcohol consumption; although the overall model was not significant. These findings are not consistent with studies that have found gender to moderate the relationship between alcohol consumption and mental health problems. For instance, Geisner et al. (2004) have found that the relationship between psychological distress and alcohol consumption was significantly stronger for males than for females ($t(1698) = 3.69$, $p < .001$). Men who were more distressed had more alcohol-related problems than women showing the same levels of distress (Geisner et al., 2004). Males were found to be more likely to cope with depressive symptoms by drinking, ignoring the problem, and taking drugs, while females are more likely to take medication, confide in friends, or seek a doctor's help (Geisner et al., 2004).

A possible explanation for the discrepancy was that mental health issues and drinking tended to co-occur because of other factors rather than race/ethnicity, gender, and income. It is

likely that there are other factors influencing the relationship between mental health status and drinking. According to a recent study that looked at contextual factors that can differentiate between student problem and non-problem drinkers (Beck et al., 2013), problematic drinkers, especially those meeting the criteria for the most severe form of alcohol use disorder, drink in a variety of contexts and no single factor is likely to be sufficient at predicting their drinking patterns (Beck et al., 2013).

Drinking might be related to underlying personality and temperament traits that predispose college students to become problematic drinkers (Beck et al., 2013). In conclusion, it is possible that there is no relationship between the mental health status and drinking; it is possible that other factors are moderating the relationship between the two (Beck et al., 2013). Other considerations, such as common genetic contributions to alcohol use disorders, such as biological and environmental factors (Cronk & Piasecki, 2010), were not assessed in the current study. Some researchers, using naturalistic methods, have found that mental health status is not a strong predictor of alcohol use in college students when controlling for other drug use (Cronk & Piasecki, 2010; Magid et al., 2009). Future research should seek to distinguish subsets of drinkers based on their drinking habits, motives for drinking, and sensitivity to the influence of environmental events on their drinking behavior (Cronk & Piasecki, 2010). It is possible that this categorization scheme reduced variability among the different levels of drinking, thereby obscuring a relationship between gender and alcohol use (Cronk & Piasecki, 2010). An alcohol-use variable with more categories might have been more sensitive to gender differences in alcohol use (Cronk & Piasecki, 2010).

Income did not influence the relationship between alcohol consumption and mental health status ($p = .327$), and low-income college-aged adults did not report a higher rate of alcohol

consumption. This is also not consistent with Pollack and associates (2005), who found young adults from low-income neighborhoods had substantially higher levels of alcohol consumption than those in more affluent neighborhoods (OR =1.30; 95% CI = 1.08, 1.56). Females and males in low-income neighborhoods were more likely to be heavy drinkers. The researchers also suggested that the social and cultural climate in the lowest SES neighborhoods may make alcohol consumption more acceptable (Pollack, et al., 2005).

Upon further examination, the result of this study shows no significant influence of race/ethnicity on alcohol consumption (p = .734), such that White college-aged adults did not report higher rates of alcohol use than other races and ethnicities. This is not consistent with Skidmore and associates (2012) who revealed that European American college students reported more alcohol use and alcohol-related problems than African American college students (p<.001), and that female student encountered more problems than male students (p<.001) (Skidmore et al., 2012). They also suggested that experiencing alcohol-related problems is normative for European American students.

Individual (e.g. genetic predispositions, religious affiliation), familial (e.g. parental psychopathology), and community-level (e.g. social norms regarding alcohol) influences were not incorporated in the study, which likely plays a role in the relationships between race/ethnicity, mental health, and alcohol use in the United States (Meyers et al., 2017). Future longitudinal studies should be employed to identify underlying mechanisms and to disentangle the complex relationships between mental health issues and alcohol use behaviors across race/ethnic groups (Meyers et al., 2017).

Public Health Implications

Although the findings of this study were not significant, the literature supports the relationship between the mental health status and alcohol consumption. Universities are considered a perfect setting for implementing mental health promotion programs that would aim to increase the awareness of mental health issues and responsible alcohol consumption (Aurora et al., 2016). Furthermore, the literature also highlights the need to address the mental health needs of low-income, White male students who are more likely to have a greater prevalence of mental health problems correlated with hazardous drinking. Thus, there is a need to design interventions that are universal to reduce the stigma associated with mental health problems, selected interventions that are gender-focused, and indicated interventions that would assist students who are experiencing problems as a result of hazardous drinking (Godette et al., 2009). For instance, interventions that conduct concise screenings of depression, anxiety, and drinking among low-income, White male college students (Geisner et al., 2012). Screening can be easily implemented in offices on campus in which college students are querying health care or health information (e.g., campus counseling, wellness, and health centers) (Geisner et al., 2012).

Screening identifies college students who are at an increased risk for developing mental health problem or alcohol problems (Aurora et al., 2016). Medical surveillance programs can identify students who have, or who are developing, mental health issues (Aurora et al. 2016). These programs can also be used to avoid the worsening of symptoms by implementing preventive measures (Aurora et al., 2016). Screening may act as a starting point for surveillance strategies (Aurora et al., 2016). The rationale of medical surveillance is to reduce the burden of mental health issues and alcohol hazardous alcohol consumption among low-income, White male college students through targeted interventions (Godette et al., 2009). Furthermore, interventions should be youth-friendly to support an environment that decreases the stigma associated with

mental health issues and provide easy access to mental health services (Aurora et al., 2016). It is important to generate efficient, effective, and productive prevention strategies and to educate youths about drinking limits rather than just forbidding alcohol use (Godette et al., 2009).

Finally, public health policies and educational methods and policies should consider the vulnerability factors that influence the way young adults engage in alcohol consumption (Onyebuchukwu et al., 2015), especially in the case of low-income college students, and require increased prevention and correction efforts so that drinking does not become a core aspect of students' personalities. Students with maladaptive personality structures may need to be oriented toward creative, dynamic means of socializing and spending time, or manifesting energy (e.g., team sports, bike riding, literary or art contests, dance, theater clubs, workshops on healthy lifestyles) (Onyebuchukwu et al., 2015). Pro-social leisure education should start in childhood both in the home and at school.

Limitations of the Study

The results of this study indicate that there is no relationship between mental health status and alcohol consumption. Further, gender, race/ethnicity, and income do not appear to influence or confound the relationship. There are several limitations to this the study. First, using a cross-sectional study design presented only a one-time view of the relationships among all of the variables that were determined, eliminating the ability to observe these behaviors change over a long period of time (ex. the move from college freshmen to college senior); therefore, this is not a routine finding that would be seen over time (Salazar et al., 2015). The cross-sectional design was not the most robust design to assess the association between mental health and alcohol consumption due to the inability to establish causal relationships (Salazar et al., 2015). This study can only look at the associations between the two variables at this specific time (Salazar et

al., 2015). Future research may seek to take on a longitudinal approach in which participants are assessed in high school, college, and after graduation to see if the results are consistent and carry through adult development.

Second, for convenience, and to ensure there were enough participants in each category, all male students who reported having five or more drinks on one occasion and females having four or more drinks on one occasion were categorized as "Yes" for alcohol consumption. All other students were categorized as "No." It is possible that this categorization scheme reduced variability among the different levels of drinking, thereby obscuring a relationship between mental health status and alcohol use. An alcohol-use variable with more categories might have been more sensitive to mental health problems as they are related to alcohol use. Similarly, the way that the mental health status variable was coded categorized all students who reported to have not experienced good mental health during the past 30 days as having poor (14-30 days when mental health not good) mental health. All other students were categorized as having good (0-13 days when mental health not good) mental health. It is possible that this categorization scheme reduced variability among the different issues of mental health status, thereby obscuring a relationship between mental health status and alcohol use.

Third, social desirability bias could play a part in the reporting of accurate mental health status and alcohol consumption. There is a tendency of questionnaire respondents to answer questions in a way that will be viewed favorably by others (Keyes et al., 2008). This may present itself in the form of over-reporting "good respondent behavior" or under-reporting "bad respondent or undesirable behavior" (Keyes et al., 2008). This could explain the fact that 88% of respondents did not report consuming alcohol. This type bias interferes with the interpretation of common tendencies as well as individual differences (Keyes et al., 2008).

Fourth, the 2016 BRFSS dataset relies on information reported directly by the participants; it may be subjected to many sources of possible error. The BRFSS is a complex telephone survey which would include a statistical error in the data collection. Overall, four types of errors are involved in it. The first is no-coverage error. Households without telephones make this a larger source of non-coverage error. For example, college-aged adults living in the South, minorities, and those in lower socioeconomic groups typically have lower telephone coverage. College-aged adults without telephones tend to have lower household incomes, and low-income is associated with specific health risk behaviors. Furthermore, interviews are conducted only in English and Spanish, so college-aged adults who are not able to be interviewed in English or Spanish were not included. Households without telephones are not contacted. Hence, the 2016 BRFSS findings can only be generalized to English and Spanish speaking college-aged adults living in houses with phones. This is called "selection bias."

Then there is a sampling error. Like all the other survey data, all estimates in BRFSS are based on only a sample of the population rather than on the entire community. For example, it is possible that the people who chose to participate are different than those who did not; this may lead to sampling error. Third is the non-response error. All surveillance data would be hard to avoid this error where two levels of non-response showed: unit non-response and item non-response. In BRFSS data, if a person refuses to participate or didn't respond or the person can't understand English and Spanish, then a unit non-response occurs. Item non-response occurs when useful data are not obtained for all questionnaire items.

Finally, there is a measurement error. The quality of measurements in BRFSS data can be affected by the question order, question-wording, response-code precision, recall error, length of the interview, interviewer technique, coding errors, and simple data entry error. For example,

how questions are worded may elicit responses in a certain way. Likewise, the ability to precisely recall details varies by person and how much time has passed since the event he/she is trying to recall. All data in the 2016 BRFSS are obtained by self-report and are subject to recall bias or may be under-reported or over-reported.

Conclusion

The results of this study indicate there is no relationship between mental health status and alcohol consumption. Further, gender, race/ethnicity, and income do not influence or confound the relationship. The findings from this study are inconsistent with other studies which demonstrate that college-aged adults who report mental health problems are more likely to experience alcohol consumption. Future research may seek to take on a longitudinal approach in which participants are assessed in high school, college, and after graduation to see if the results are consistent and carry through adult development. The variables used in the study cannot definitely show a cause and effect relationship between mental health status and alcohol consumption gender, race/ethnicity, and income level. Other variables may also affect alcohol use, such as marital status, genetic predisposition, and family history, and should be considered in future studies that seek to understand relationships between mental health status and alcohol use.

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Appendix A: IBR APPROVAL LETTER

RE: IRB Review
IRB No.: 089-1718-EXM

Project: Examining the Relationship Between Mental Health Status and Alcohol Consumption Among College-Aged Adults

Date Complete Application Received: 4/9/2018

Principle Investigator: Narjs Omar Kozam
Faculty Advisor: Marshare Penny

College/Department: CHS

IRB Determination: Exempt Application Approved – Student research using publically available, deidentified secondary data. Data analysis may begin, in accordance with the final submitted documents and approved protocol.

Future Correspondence: All future correspondence about this project must include all PIs, Co-PIs, and Faculty Advisors (as relevant) and reference the assigned IRB number.

Approval Information: Requests for a change to protocol must be submitted for IRB review and approved prior to implementation. At the completion of the project, you are to submit a Research Closure Form.

Researcher Responsibilities: The researcher is responsible for ensuring that the research is conducted in the manner outlined in the IRB application and that all reporting requirements are met. Please refer to this approval and to the IRB handbook for more information.

Date: April 10, 2018

Appendix B: TABLES AND FIGURES

Table 1

Demographic Characteristics of 2016 BRFSS Respondents (n=1,087)

Variable	*n*	%
Gender		
Male	612	56.3
Female	475	43.7
Race/ Ethnicity		
White	357	32.8
Black	49	4.5
Asian	159	14.6
Hispanic	449	41.3
Other race	67	6.2
Age	21*	
Alcohol Consumption		
No	743	74.8
Yes	250	25.2
Mental Health Status		
Good	953	87.7
Poor	132	12.1

*Mean value reported

Table 2

Bivariate Association between Alcohol Consumption and Mental Health

Mental health status	No N(%)	Yes N(%)	Adjusted OR (95% CI)
Good*	655(88.3)	214 (85.6)	1.27
Poor	87 (11.7)	36 (14.4)	(.83 - 1.92)

OR, odds ratio; CI, confidence interval. Chi-square test was used to assess the relationship between mental health status and alcohol consumption. * Referent group. **p = .267

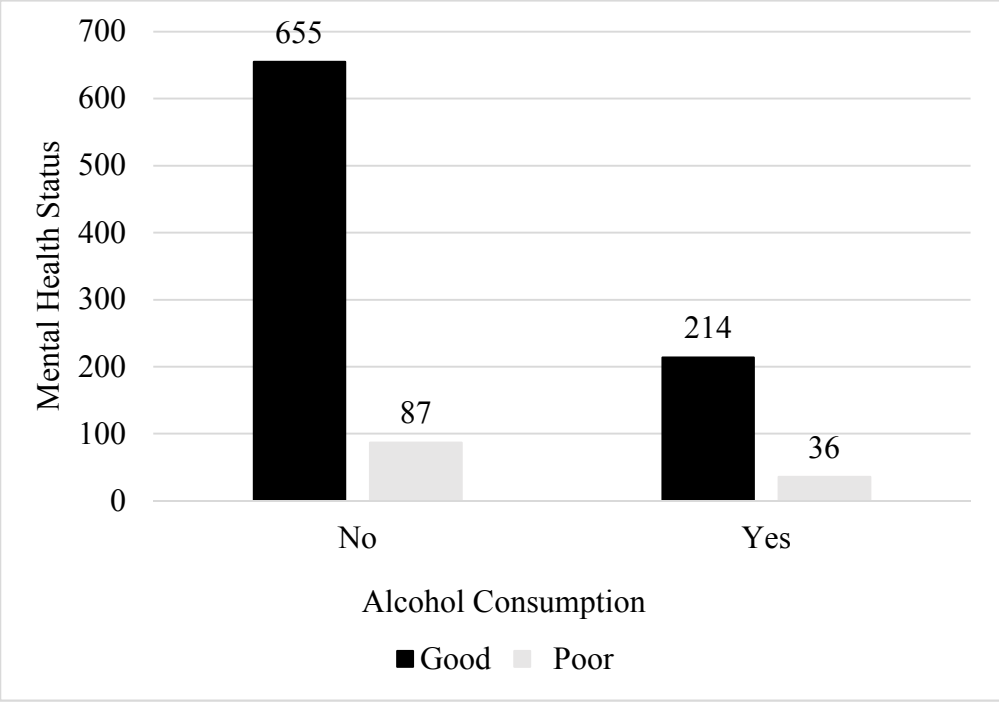

Figure 1. The frequency of alcohol consumption in mental health status

Table 3

Summary of Logistic Regression analysis for variables predicting alcohol consumption

	Predictor	B	SE B	β	CI
Model 1					
	Constant	-1.36	0.253	0.258	
	Mental Health status	0.236	0.213	1.27	(.834, 1.92)
Model 2	Constant	-0.549	1.33	0.578	
	Race/Ethnicity				
	White*				
	African American	-19.46	11452.8	0.001	(.001, 1.00)
	Asian	-0.085	0.895	0.919	(.159, 5.31)
	Hispanic	0.645	0.663	1.91	(.520, 6.99)
	Other Race	0.339	1.019	1.4	(.191, 10.34)
	Mental Health Status	0.526	0.537	1.69	(.591, 4.85)
	Income Level	-0.256	0.364	0.774	(.379, 1.58)
	Gender	-0.839	0.367	0.432**	(.210, .887)

Note: R^2 = .002 for Model 1 (p >.05), ΔR^2 = .096 for Model 2 (p >.05). CI, confidence interval.
*Referent group. **p <.05