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Problem drinking behaviors:

Differential effects of stress and type of school on black versus white college students

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**Problem drinking behaviors:
Differential effects of stress and type of school on black versus white college students**

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Bachelor of Arts, Bachelor of Science

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2010

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An abstract of
A thesis submitted to the Faculty of the
Rollins School of Public Health of Emory University
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2012

Abstract

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Objective: To explore sociodemographic and psychosocial factors related to problem drinking behavior (PDB; i.e., binge drinking, driving after drinking, having intercourse after drinking) among Black and White college students.

Participants: 4,098 two- and four-year college students in the Southeast in October 2010.

Methods: We conducted an online survey assessing sociodemographics, depressive symptoms, perceived stress, satisfaction with life, and PDB.

Results: We found an interaction between ethnicity and gender such that, among Whites, females had less PDB than males. The difference in PDB was less pronounced among Black females vs. males. We also found an interaction between ethnicity and school type such that Whites from four-year vs. two-year schools had greater PDB. An interaction was also found between ethnicity and stress – Blacks were more negatively affected by high stress in terms of PDB.

Conclusions: These distinct relationships among Black and Whites suggest different risk profiles and potentially intervention targets for PDB.

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Table of Contents

Chapter I: Introduction.....	1
Problem Statement.....	1
Theoretical Framework.....	3
Purpose of the Study.....	4
Chapter II: Review of the Literature.....	6
Chapter III: Methodology	15
Procedure	15
Measures	15
Data Analysis	18
Chapter IV: Results	19
Participant Characteristics	19
Bivariate Analyses.....	19
Multivariate Analyses.....	20
Chapter V: Discussion	22
Implications	23
Limitations	24
Conclusion	25
References	26

Appendix A: Tables & Figures	33
Table 1: Participant Characteristics.....	34
Table 2: Bivariate Analyses Examining Factors Associated with PDB.....	35
Table 3: Multivariate Regression Model Indicating Factors Associated with PDB Index	36
Figure 1: Interaction Between Ethnicity and Gender on PDB.....	37
Figure 2: Interaction Between Ethnicity and Type of School of PDB	38
Figure 3: Interaction Between Ethnicity and Perceived Stress on PDB.....	39

Chapter I. Introduction

Problem Statement

For college students living in the United States, alcohol is the number one drug of choice,¹ and its consumption is often considered a normative experience.^{2,3} Today, drinking to excess among American college students is recognized as a national problem with serious consequences,⁴ as students are more likely to consume alcohol and drink more heavily compared to young adults who are not attending college.^{1,5,6} More than 70% of college students report that they have consumed alcohol within the past 30 days, many consuming it heavily.⁷ It has been estimated that 2 in 5 college students report binge drinking (defined as having 5 or more drinks during one occasion for males or 4 or more drinks for females) in the previous 2 weeks.⁷ Compared to typical four-year college students, the rates of alcohol consumption among community college students appear to be lower, with only 25% of students reporting recent binge drinking.⁸ In terms of racial differences, previous studies have shown that African American young adults, overall, report lower rates of alcohol use and binge drinking than White and Hispanic young adults.^{9,10}

From 1998 to 2005, alcohol-related deaths among US college students rose from 1,400 to 1,825 in addition to approximately 600,000 injuries, 690,000 assaults, and 97,000 cases of sexual assault or date rape each year. The Centers for Disease Control and Prevention (CDC) have previously reported that 500,000 college students were unintentionally injured because of drinking and more than 60,000 were assaulted by another drinking student during the years of 1998 to 2001.¹¹ According to Hingson et al. (2005), the CDC also reported that alcohol-related unintentional injury deaths showed an

increase of 6% in the college student population and that the proportion of 18- to 24-year-old college students who reported driving under the influence of alcohol increased from 26.5% to 31.4%.¹¹ Presley and Pimentel (2006) found that college students who were high-risk drinkers (5 drinks on one occasion) on a frequent basis (3 or more occasions per week) experience half of all negative consequences reported by all drinkers.¹² Excessive drinking is currently the third leading preventable cause of death in the United States.¹³

Heavy alcohol consumption may also result in enormous personal, physical, familial, and financial consequences.¹⁴ According to Saunders et al. (2011), alcohol is a cause of reduced school concentration, job performance, absenteeism, family problems, suicide, homicide, and crime.¹⁵ Additionally, chronic excessive alcohol intake may have great effects on the brain development of adolescents and young adults, leading to increased risks of subsequent health and behavioral problems.¹⁶ Heavy alcohol consumption has also been strongly associated with depressive symptoms¹⁷ and frequently plays a role in suicide attempts.¹⁸ In addition, it has been previously suggested that alcohol-related problems are associated with increased levels of stress and depression.^{19,20} In a study involving 353 college students, Murphy et al. (2005) suggested an association between decreased life-satisfaction and alcohol-related problems among both men and women.²¹

In addition to these consequences of alcohol, two commonly reported risk behavior areas coinciding with alcohol consumption and binge drinking include sexual health risk behaviors and driving after alcohol consumption. Frequent and/or heavy alcohol consumption is associated with an increased risk of unprotected sex,²² increased

numbers of sexual partners,^{23,24} increased risk of pregnancy,^{23,24} and increased rates of self-reported and medically verified sexually transmitted infections.^{23,24} In addition, approximately 2.8 million college students between the ages of 18 to 24 reported driving under the influence of alcohol, with other research indicating that more than one-fourth of college students drive while under the influence of alcohol each year.²⁵ In three previous studies, it was estimated that the rates of alcohol-related traffic deaths among college students range from 14.1 to 15.2 deaths per 100,000.^{11,25,26} In a report by the National Center on Addiction and Substance Abuse at Columbia University, the number of unintentional alcohol-related traffic fatalities increased from 1,248 in 1998 to 1,349 in 2001.²⁷

While most previous research studying college health programs have focused primarily on students attending traditional four-year colleges,²⁸ very little attention is given to students who are less connected to the typical college lifestyle including those from community colleges.²⁹ Over the past 40 years, the number of students enrolled in community colleges have experienced a five-fold increase compared to the enrollment of students at traditional four-year colleges which has only doubled.³⁰ Currently, there are approximately 1,685 public and independent community colleges nationwide³⁰ with an estimated combined total of 6.5 million students enrolled.³¹

Theoretical Framework

The Problem Behavior Theory (PBT)³² suggests that multiple factors contribute to problem behaviors, defined as socially problematic, concerning, or undesirable behaviors usually eliciting some form of social or personal consequence (e.g., disapproval from

others, incarceration, health compromise). The theoretical framework includes three major systems of explanatory variables: (1) the perceived-environment system, involving social controls, models, and support; (2) the personality system, involving values, expectations, beliefs, attitudes, and orientations toward self and society; and (3) the behavior system, encompassing both problem and conventional behaviors. Considering these explanatory systems, engaging in health-compromising behaviors (i.e., binge drinking, sexual risk behaviors, driving under the influence of alcohol) may be associated with environmental factors such as college setting or culture as influenced by ethnicity, as well as personality system factors such as perceived stress, depression, and satisfaction with life. This theory has been supported by prior research, which has documented that adolescents who engage in one high risk behavior are more likely to engage in other risky health behaviors. For example, alcohol use is among the strongest predictor of an increased number of sexual partners among African American adolescent females.³³

Purpose of the Study

The aim of this study was to determine the sociodemographic and psychosocial factors impacting problem drinking behavior (i.e., binge drinking, driving after drinking, having sexual intercourse after significant alcohol consumption) among black and white individuals attending two- and four-year colleges. In line with the PBT, we hypothesized that factors from the behavioral system – binge drinking, drinking and driving, and sexual intercourse after alcohol consumption – might be related to factors in the perceived-environment system (college setting, ethnic background) and personality system

(depression, perceived stress, satisfaction with life) among ethnically diverse college students attending two- and four-year colleges.

Chapter II. Review of the Literature

Historically, the issue of alcohol consumption in college has been frequently studied in the past to present day. As aforementioned, the majority of previous college health studies have primarily focused upon students attending traditional four-year institutions as opposed to the two-year college population. Prior research has documented the prevalence of alcohol consumption, dependency, and abuse as, identified some factors determining consumption, and examined the health consequences of problem drinking behaviors. Important findings and implications of several relevant studies are described in this review.

In an observational study involving a random sample of 800 undergraduate students from a northeastern US college, O'Hare (1990) examined college drinking and drug usage by sex and other background variables, alcohol-related problems, and contextual drinking factors.³⁴ The collection process utilized an explanatory survey based on a mailed questionnaire that was sent to the randomly selected sample of undergraduates in September of 1987. As a result, 606 surveys were completed yielding a 75.8 percent response rate. Of those who responded, 81.5 percent were reported drinkers. Specifically, 25.2 percent were light drinkers (having one drink less than once per month to two drinks twice per month), 19.5 percent light-moderate drinkers (one drink once per week to four drinks twice per month), 17.1 percent heavy-moderate drinkers (three drinks once per week to 16 or more drinks twice per month), and 18.8 percent heavy drinkers (five drinks once per week to 16 or more drinks more than seven times per month). After controlling for race, the results suggested that White students consume the most alcohol.

This finding, according to O'Hare, showed heavy drinking rates comparable to a previous large college sample in the northeast. In addition, men (26.5 percent) were twice as likely to be heavy drinkers compared to women (13.1 percent). Interestingly, the study also found a weak, but significant correlation between drinking and marijuana use.

Other studies have yielded similar conclusions. For example, in a national study of over 10,000 junior and senior high school students, Jessor et al. (1980) found significant correlations with marijuana use including greater actual involvement in other problem behaviors such as drunkenness.³⁵ Data analyzed in this study was from the 1974 National Study that provided nationwide baseline data on the prevalence and correlates of adolescent drinking, problem drinking, and drug use. According to Jessor, the observed relationship between marijuana use and problem drinking among American adolescents is worth particular public health attention.

In more recent studies, the prevalence of alcohol abuse and dependence among U.S. college students continue to remain high. For example, in a study involving more than 14,000 students at 119 4-year U.S. colleges, Knight et al. (2002) aimed to estimate the prevalence of alcohol abuse and dependence among U.S college students and to identify the characteristics associated with these diagnoses.³⁶ Students in the study completed a questionnaire including items corresponding to DSM-IV diagnostic criteria for alcohol abuse and dependence. Specifically, students were classified into the following drinking categories: abstainers (students who reported drinking no alcohol within the past year), non-heavy episodic drinkers (students who drank alcohol during the past year but did not report any heavy drinking episodes in the past 2 weeks), occasional

heavy episodic drinkers (students who reported heavy episodic drinking on one or two occasions during the past 2 weeks), and frequent heavy episodic drinkers (students who reported heavy episodic drinking on three or more occasions during the past 2 weeks). As a result, 31.6 percent of the 14,115 students in the final sample were classified as those with alcohol abuse as 6.3 percent were classified with alcohol dependency. Students with alcohol dependence were also more likely male and White, less likely to be 24 years or older or married, and more likely to have parents who graduated from college compared to non-alcohol dependent students. In addition, students who had used marijuana in the past 30 days, smoked cigarettes, or reported multiple sexual partners were more likely to be classified with alcohol abuse or dependence. Overall, this study suggested a high prevalence of alcohol disorders (more than 30 percent of students reporting one or more symptoms of abuse) among U.S. college students and highlighted the need for future implications to address the issue of alcohol abuse and dependency among college campuses.

With previous studies identifying varying but alarming rates of alcohol consumption among college campuses, others have sought to identify the factors that influence drinking. Weitzman et al. (2003), in a study analyzing self-reported responses of students in the 1999 Harvard School of Public Health College Alcohol Study (CAS), aimed to identify person, social group, and environmental factors associated with uptake of binge drinking.³⁷ CAS data was collected using a mailed questionnaire containing student reports about their alcohol and substance use, school activities, and background characteristics. Nearly 1,900 first-year college students were included in the study. Overall, approximately 36 percent (n = 683) of the sample reported abstaining from

alcohol while another 38 percent (n = 717) reported drinking but not binge drinking. The remaining 26 percent (n = 494) comprised of occasional (i.e., 1-2 times) and frequent (greater than or equal to 3 times) binge drinking in the past two weeks. As for correlates of uptake, White students were more likely than non-White students to pick up binge drinking while in college while the proportion of students who acquired binge drinking was the same for both genders. In addition, students reported that they were exposed to “wet” environments (social, residential, and marketing surroundings in which drinking is prevalent and alcohol is cheap and easily accessed) were more likely to engage in binge drinking than others without similar exposures. Thus, Weitzman et al. suggest that potential implications may aim to limit access and availability, control cheap prices, and maximize substance-free environments and associations.

While the focus of many college health studies has involved students primarily from traditional four-year colleges, there have been some efforts to determine the issue of alcohol consumption among two-year institutions. Chen et al. (2003), in an observational study involving students from a two-year community college in California, sought to examine the prevalence of malt liquor use and its relationship with heavy or problem drinking or other substance use.³⁸ A survey was administered in 2002 for a period of two weeks during classes by trained staff members. A total of 1,409 students were invited to participate with 1,226 completing the study (response rate of 87 percent). Students were asked whether they had drunk any alcohol within the past 12 months and also answered items from the Alcohol Use Disorders Identification Test (AUDIT) which identifies whether or not certain individuals are consuming a harmful amount of alcohol. This study also assessed the students’ engagement in problem drinking behaviors defined as cutting

classes, cheating in school, purposely damaging others' property, stealing from stores, and other behaviors that do not include driving after drinking or having sexual intercourse after significant consumption of alcohol. Overall, 74 percent of the participants reported drinking alcohol in the past 12 months with 52 percent reporting alcohol use in the past 30 days. In regards to differences among gender and race/ethnicity, alcohol use was significantly more prevalent among male students than among female students in the past 12 months and less prevalent among Asian American and African American students. While this study did involve a community college student population, its primary focus was purely on malt liquor consumption and its correlations with heavy drinking and problem drinking behaviors. The consumption of other alcoholic beverages and forms of problem drinking behaviors such as drunk driving and having sexual intercourse after drinking were not analyzed in this study.

A more recent study involving community college students was conducted by Sheffield et al. (2005) to assess the frequency of binge drinking and its association with high-risk behaviors.³⁹ Participants were solicited from 45 classes on a single campus of a large urban community college in the southeastern region of the United States. Students who were aged 18 years and older and able to speak English were invited to participate by providing consent and completing a self-administered survey. A total of 789 participants completed the survey with 27 excluded due to the number of missing data. In regards to data analysis, participants were classified into one of three groups based upon alcohol use: current nondrinkers, non-bingers, and binge drinkers. Overall, the sample of community college students was comprised of 16 percent current nondrinkers, 59 percent non-bingers, and 25 percent binge drinkers. The authors also compared the three groups

of alcohol consumers in terms of lifetime alcohol-related problems and found that twenty-four percent of binge drinkers reported school problems compared to 6 percent of non bingers and 3 percent of nondrinkers. Bingers were also twice as likely to experience legal problems compared to non-bingers. Thus, the findings of this study suggest the existence of binge drinking, although at a lower estimate in comparison to previously reported rates of four-year schools, among two-year college campuses. The authors believe that demographic differences between community college and four-year college students may be an attribute to the varying rates of binge drinking among the two types of academic institutions.

In addition to identifying the rates and severity of alcohol consumption on college campuses, several studies have also attempted to identify the health risk factors that result from problem drinking. In a random sample (N = 10, 904) of full-time college students, Wechsler et al (2003) found that drinking and driving behaviors are prevalent among college students but differ among various student subgroups.⁴⁰ Participants of this study completed self-administered questionnaires that examined driving after consuming alcohol while also asking about riding in a vehicle with a high or drunk driver. According to the authors, the prevalence of drunk driving among college students vary significantly according to the policy environments at both the local and state level and the strength of enforcement of these policies.

In another study by Wechsler et al. (1994), self-reports of drinking behavior, alcohol-related problems, and other problems were measured among a nationally representative sample of 4-year college students.⁴¹ A total of 179 colleges were selected

from the American Council on Education's list of 4-year colleges and universities using probability proportional to enrollment size sampling. Seventy-two percent (140 colleges) agreed to participate in this study and were sent specific guidelines to draw samples of students based upon the total number of enrolled full-time undergraduates. Overall, 17,592 out of nearly 30,000 students fully completed the administered questionnaires (response rate of 69 percent). As a result, 44 percent of college students were classified as binge drinkers including nearly one-fifth of the students who were frequent binge drinkers. Additionally, frequent binge drinkers were more likely to experience serious health and other consequences as a result of their drinking behaviors. Nearly half (47 percent) of the frequent binge drinkers experienced five or more drinking-related problems including injuries and engaging in unplanned sexual intercourse. Wechsler et al. suggest long-term, large-scale behavioral change strategies as potential interventions as the likelihood of immediate results is unlikely.

In regards to alcohol consumption and its relationship with sexual activity which has previously been investigated on several occasions as mentioned in Chapter 1, Megan E. Patrick and Jennifer L. Maggs (2009) aimed to study not only the links between alcohol use and sexual behavior, but also whether sexual behavior is more likely when the same individuals drink in greater quantity.⁴² Using a sample of traditionally-aged first year college students, Patrick and Maggs aimed to answer the two following questions: are first-year college students more likely to engage in sexual behaviors and to experience short-term consequences of sexual behaviors on days they drink more alcohol?; are within-person daily associations between alcohol use and sexual behaviors stronger for those with more positive alcohol-sex expectancies? Students were invited to

complete a baseline web-based survey and then 14 consecutive daily web-based surveys. The surveys assessed the students' relationship status, alcohol expectancies regarding sex, alcohol use, and sexual behaviors. After controlling for several factors (individual factors, weekend versus weekday alcohol consumption), results of multilevel models suggest that independent of alcohol use, consuming more drinks on a given day was associated with a greater likelihood of oral sex and with experiencing more short-term positive consequences of sex on that day. Between-persons, the likelihood of engaging in any sex on average across days did not differ among males or females or by the average number of drinks. Participants in more committed relationships, however, were more likely to report any sex. Overall, significant alcohol use by alcohol-sex expectancies interactions were found for oral sex and total sex behaviors which, as noted by the authors, indicated that individuals with more positive expectancies were more likely to have sex after drinking alcohol. In addition, it was suggested that future interventions aiming to further investigate how drinking affects sexual behaviors ought to utilize measures of environmental influences supporting or inhibiting sex.

In summary, previous studies have documented varying estimates of alcohol consumption among college campuses nationwide. Although the majority of alcohol studies appear to focus primarily on traditional four-year colleges and institutions, some researchers have attempted to fill the knowledge gap by studying alcohol consumption among the smaller, but growing community college student population. Interestingly, illicit drug-use, particularly marijuana, also appears to be correlated with alcohol consumption. Problem drinking behaviors, although defined in various ways in different studies, have also been examined but have been limited to a few outcomes such as

academic achievements or detriments, engaging in vandalism, and involvement with legal issues. Driving after significant alcohol consumption and having sexual intercourse after significant alcohol consumption have also been identified as potential consequences of problem drinking behavior. Ultimately, it is apparent that the consumption of alcohol among college campuses, both at four- and two-year schools, is prevalent and a public health issue of concern. Thus, in attempt to add to the growing but limited body of knowledge regarding alcohol consumption, this study aims to determine the sociodemographic and psychosocial factors impacting problem drinking behavior (i.e., binge drinking, driving after drinking, having sexual intercourse after significant alcohol consumption) among black and white individuals attending two- and four-year colleges.

Chapter III. Methodology

Procedure

In October, 2010, students at six colleges (three four-year universities, three two-year community or technical colleges) in the Southeast were recruited to complete an online survey.⁴³ A random sample of 5,000 students at each school (with the exception of two schools who had enrollment less than 5,000) were invited to complete the survey (total invited N=24,055). Students received an e-mail containing a link to the consent form with the alternative of opting out. Students who consented to participate were directed to the online survey. To encourage participation, students received up to three e-mail invitations to participate. As an incentive for participation, all students who completed the survey received entry into a drawing for cash prizes of \$1,000 (one prize), \$500 (two prizes), and \$250 (four prizes) at each participating school. Of students who received the invitations to participate, 4,849 (20.1%) returned a completed survey. The current analyses focused on the 4,098 participants who had complete data and reported their ethnicity as being White or Black. The Emory University Institutional Review Board approved this study, IRB# 00030631.

Measures

Demographic characteristics assessed included students' age, gender, ethnicity, highest parental educational attainment, and type of school attended (two-year vs. four-year). Ethnicity was categorized as non-Hispanic White, Black, or Other due to the small numbers of participants who reported other race/ethnicities. Highest parental educational attainment was categorized as < Bachelors degree versus \geq Bachelors degree based on the

distribution of parental educational attainment. These categorizations were chosen for ease of interpretation.

Problem Drinking Behaviors. To assess problem drinking behaviors, three questions were asked: 1) “In the past 30 days, on how many of those days did you drink more than 5 alcoholic drinks on one occasion?”; 2) “Did you drink alcohol or use drugs before you had sexual intercourse the last time?” (response options: yes, no, have not had sex); and 3) “During the past 30 days, how many times did you drive a car or other vehicle when you had been drinking alcohol?” For the second question regarding alcohol or drugs prior to the last sexual episode, we examined the number of individuals that reported marijuana use but not alcohol use in the past 30 days, and 88% of those who reported use of marijuana had also used alcohol frequently. Thus, despite this limitation in the assessment, we believe that the majority of students who engage in drug use also engage in alcohol use and may do so concurrently. We further collapsed this variable into those who had used drugs or alcohol prior to the last sexual intercourse versus those who had not or had not had sex previously. We also dichotomized the variable for binge drinking (yes versus no) and drinking and driving (yes versus no).

We then created an aggregate problem drinking score, with a range of 0 to 5. Using alcohol or drugs prior to last intercourse was maintained as a dichotomous variable, with 0 indicating no use prior to last intercourse and 1 indicating use. Binge drinking was recoded into a sub-score of 0 to 2, with 0 indicating no binge drinking, 1 indicating binge drinking one to two times in the past 30 days, and 2 indicating binge drinking on three or more days in the past 30 days. Driving after drinking was recoded into a sub-score of 0 to 2, with 0 indicating no drinking and driving, 1 indicating drinking

and driving once in the past 30 days, and 2 indicating drinking and driving on two or more days in the past 30 days. A score of 5 indicated engaging in all three problem drinking behaviors and frequently engaging in binge drinking and driving after drinking (see **Table 1** of Appendix A for distribution of each behavior category; Cronbach's alpha = 0.58).

Depressive Symptoms. Participants were asked to complete the Patient Health Questionnaire (PHQ-2),⁴⁴ which is a 2-item depression screening tool, based on DSM-4 diagnostic criteria, assessing frequency of depressed mood (“feeling down, depressed or hopeless”) and anhedonia (“little interest or pleasure in doing things”) over the past two weeks. Responses were rated on a 4-point Likert scale and ranged from “not at all” (0) to “nearly every day” (3). A total score ≥ 3 has been used to reflect clinical depression.⁴⁴ Using a mental health professional interview as the criterion standard, a PHQ-2 score ≥ 3 had a sensitivity of 83% and a specificity of 92% for major depression, indicating that a PHQ-2 score of 3 is the optimal cutpoint for screening purposes.

Perceived Stress. Participants were asked to complete the Perceived Stress Scale – 4 item (PSS-4),⁴⁵ which assesses the degree to which situations in one's life are appraised as stressful. Items were designed to tap how unpredictable, uncontrollable, and overloaded respondents find their lives. The questions in the PSS ask about feelings and thoughts during the last month. In each case, respondents are asked how often they felt a certain way. Cronbach's alpha in the current study was 0.74.

Satisfaction with Life. Participants were asked to complete the Satisfaction with Life Scale (SWLS),⁴⁶ which is a 5-item scale designed to measure global cognitive judgments of satisfaction with one's life. Participants are asked the extent to which they

agree on items, such as “In most ways my life is close to my ideal”, using a 7-point Likert scale (1 = strongly disagree to 7 = strongly agree). Cronbach’s alpha in the current study was 0.89.

Data Analysis

Participant characteristics were summarized using descriptive statistics. Bivariate analyses were conducted to examine differences among groups in terms of sociodemographic and psychosocial factors in relation to the three dichotomous problem drinking behaviors, using chi-squared tests for categorical variables and t-tests for continuous variables. We then examined sociodemographic and psychosocial factors associated with the aggregate problem drinking behavior score using multivariate regression, forcing the correlates of interest into the model. We also examined interactions between ethnicity and other sociodemographic and psychosocial factors in relation to problem drinking behaviors. PASW version 18.0 was used for all data analyses. Statistical significance was set at $\alpha = .05$ for all tests.

Chapter IV. Results

Participant Characteristics

Table 1 (Appendix A) provides the participant characteristics including sociodemographic and psychosocial variables of the college students who completed the survey. Among participants, the mean age was 23.70 (SD = 7.39) with females representing the majority (71.9%, N = 2947) of the population. 53.4% (N = 2193) of the college students surveyed were White and 46.5% (N = 1905) were Black. The majority (59.7%, N = 2445) of participants were students from four-year schools as opposed to two-year schools (40.3%, N = 1653).

Bivariate Analyses

Table 2 (Appendix A) provides bivariate analyses examining sociodemographic (i.e., age, gender, ethnicity, type of school) and psychosocial (i.e., PHQ-2, PSS-4, Satisfaction with Life) variables with the following factors associated with problem drinking behavior: binge drinking in past 30 days, drug/alcohol use prior to most recent sexual intercourse, and driving after drinking in the past 30 days. Among the sociodemographic variables, factors associated with binge drinking in the past 30 days included being younger ($p < 0.001$), male ($p < 0.001$), White ($p < 0.001$), and attending a four-year school ($p < 0.001$). Factors associated with drug or alcohol use prior to most recent sexual intercourse included being male ($p < 0.001$) and White ($p < 0.001$). Correlates of drinking prior to driving in the past 30 days included being younger ($p < 0.001$), male ($p < 0.001$), and attending a four-year school ($p < 0.001$).

In terms of psychosocial variables, having significant depressive symptoms, as indicated by the PHQ-2 scores, was significantly associated with binge drinking in the past 30 days ($p < 0.001$), using drugs or alcohol prior to most recent sexual intercourse ($p < 0.001$), and driving after drinking in the past 30 days ($p < 0.001$). Perceived stress was significantly associated with binge drinking in the past 30 days ($p < 0.001$), using drugs or alcohol prior to most recent sexual intercourse ($p = 0.01$), and driving after drinking in the past 30 days ($p = 0.02$). Satisfaction with life was also significantly associated with all the three problem drinking behavioral factors: binge drinking in the past 30 days ($p = 0.01$); using drugs or alcohol prior to most recent sexual intercourse ($p < 0.001$); driving after drinking in the past 30 days ($p < 0.001$).

Multivariate Analyses

Table 3 (Appendix A) presents the regression models indicating factors associated with the problem drinking behavior index. Results of ordinary least squares regression indicate that being male ($B = -0.18$, CI: 0.00; 0.01 $p < 0.001$), White ($B = -0.43$, CI: -1.44; -0.61, $p < 0.001$), attending a four-year school ($B = -0.21$, CI: -0.62; -0.42), $p < 0.001$), having higher PHQ-2 scores ($B = 0.09$, CI: 0.03; 0.13, $p < 0.01$), and lower satisfaction with life ($B = -0.09$, CI: -0.02; -0.01, $p < 0.01$) were significantly associated with problem drinking behavior (per the problem drinking index score).

We also examined ethnicity and its interaction with other sociodemographic and psychosocial factors in relation to problem drinking behavior. We found an interaction effect (**Figure 1**, Appendix A) between ethnicity and gender on problem drinking behaviors ($B = 0.09$, CI: 0.05; 0.40, $p = 0.01$), such that White females had lower

problem drinking behavior index scores than White males. Black males and females had lower problem behavior drinking indexes than Whites in general; however, the decrease in problem drinking was less pronounced among Black females in comparison to Black males. We also found an interaction effect (**Figure 2**, Appendix A) between ethnicity and type of school on problem drinking behaviors ($B = 0.11$, CI: 0.20; 0.54, $p < 0.001$), such that Whites attending a four-year school had higher problem drinking behavior indexes than Whites attending a two-year school with Black students not demonstrating this trend. Finally, we found an interaction effect (**Figure 3**, Appendix A) between ethnicity and PSS-4 scores on problem drinking behaviors ($B = 0.12$, CI: 0.01; 0.07, $p = 0.01$), such that, despite having lower problem drinking behavior indexes compared to Whites, Black students seemed to be more negatively affected by higher perceived stress in terms of their problem drinking behaviors.

Chapter V. Discussion

We aimed to determine the sociodemographic and psychosocial factors impacting problem drinking behavior among black and white students attending two- and four-year colleges. Our study is the first to document the differential effects of ethnicity on problem drinking behavior in terms of gender, type of school, and perceived stress among college students. Moreover, our research included students from two-year colleges whose population have shown a five-fold increase over the past 40 years and have been studied less frequently compared to those from four-year colleges.^{29,30} Thus, this paper contributes novel information about a marginalized student population regarding a critical public health issue.

First, the results of our regression models suggested an interaction effect between ethnicity and gender on problem drinking behavior. The interaction analysis showed that White females had lower problem drinking behavior index scores compared to their male counterparts. Thus, male college students were more likely to engage in one or more of the three problem drinking behavioral factors. Previous studies have found similar findings such that males accounted for the majority of binge or heavy drinking^{47,48} and that being male was also a predictor of alcohol-impaired driving among college students.^{40,50} Furthermore, our results indicated that Black females and males demonstrated lower problem behavior drinking indexes compared to Whites overall. It should be noted that previous research have found reports of drinking among Caucasian college students to be much higher compared to the drinking rates among African-American student populations.^{1,10}

An interaction effect between ethnicity and the type of school on problem drinking behavior was also demonstrated such that White students attending four-year schools had higher problem drinking behavior indexes compared to Whites students attending two-year schools. This effect, however, was not demonstrated among Black students. Previous research suggest that while students attending four-year colleges have higher rates of binge drinking, students attending two-year schools report greater tendencies to drive under the influence of alcohol.⁵¹ In addition, previous research has shown that two-year and community college students are less likely to binge drink compared to those attending traditional four-year colleges.⁸ This difference may be due to the varying cultures and environments among two- and four-year academic institutions. Risk factors for alcohol abuse are known to be related to the presence of residence halls, fraternities and sororities, or intercollegiate athletic programs which are all relatively absent at two-year colleges.⁵¹

Another interaction, demonstrated by ethnicity and PSS-4 scores on problem drinking behavior, suggested that despite having lower problem drinking behavior indexes, Black students were more negatively affected by higher perceived stress in terms of their problem drinking behaviors compared to White students.

Implications

Our results may have several important implications for future prevention efforts. In addition to the observed interactions, our findings suggest that students who are male, attending four-year colleges, and have significant depressive symptoms are most susceptible to engaging in problem drinking behaviors. Thus, future prevention efforts

may consider placing greater emphasis on this subgroup. Additionally, while our results suggest that students attending four year colleges have higher problem drinking behavior indexes, we believe that further research is needed to accurately assess the two-year college population where a knowledge gap still exists. Specifically, perceived social norms have been suggested to play a role in being a contributor to drinking among traditional four-year colleges⁸ but has less of an impact among two-year colleges where the student population spends less time on campus venues and are less likely to view themselves as traditional college students.⁵² Thus, potential strategies to address problem drinking behavior ought to consider the differences in regards to the campus and social environments at two- and four-year schools in order to effectively implement prevention and intervention efforts. In addition, interventions that address the issue of depression among students may also assist in countering problem drinking behavior.

Limitations

Limitations to this study include limited generalizability due to recruitment at six colleges in the Southeast, with the participants being primarily female (65.8%) and White (70.2%). An additional limitation is the low response rate (20.1%), which may suggest responder bias. However, previous research has found that the average email survey response rate is 24%, which is slightly higher than the response rate for this survey.⁵³ In addition, it is possible that some recruited students did not open the e-mail or had inactive accounts, which would influence the response rate, however it is impossible to know how many emails were never received. Furthermore, previous research has indicated that, despite lower response rates, internet surveys yield similar statistics regarding health

behaviors compared to mail and phone surveys.⁵⁴ Despite these limitations, this study provides strong support for continued research on ethnic differences related to factors influencing problem drinking behaviors.

Conclusion

Regardless of the limitations aforementioned, this study still yielded important results. Interactions between ethnicity with gender, type of school, and perceived stress on problem drinking behavior were discovered. In addition, several sociodemographic and psychosocial variables were found to be significantly associated with each of the three problem drinking behavioral factors which help to guide future public health research and interventions addressing problem drinking behaviors among the college student population. Additionally, whereas many previous alcohol-related studies have focused on traditional four-year academic institutions, our study included students from both two- and four-year colleges. Ultimately, our study highlights the need for race- and gender-specific interventions that ought to consider the varying environments among two- and four-year colleges. Interventions including a component that addresses stress may also prove to be an effective strategy.

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Appendix A: Tables and Figures

Table 1. Participant characteristics

Variable	Mean (SD) or N(%)
<i>Sociodemographic variables</i>	
Age (SD)	23.70 (7.39)
Gender (%)	
Male	1151 (28.1)
Female	2947 (71.9)
Ethnicity (%)	
White	2193 (53.5)
Black	1905 (46.5)
Type of school (%)	
Four-year	2445 (59.7)
Two-year	1653 (40.3)
<i>Psychosocial variables</i>	
PHQ-2 (SD)	1.21 (1.31)
PSS-4 (SD)	6.08 (3.42)
Satisfaction with Life (SD)	22.30 (7.54)
<i>Problem Drinking Behaviors</i>	
Binge drank in past 30 days (%)	
0 days	2966 (77.1)
1-2 days	477 (12.4)
3 or more days	402 (10.5)
Used drugs or alcohol prior to most recent sexual intercourse (%)	
No	2728 (85.8)
Yes	548 (14.2)
Drove after drinking in past 30 days (%)	
0 days	3208 (83.4)
1 days	358 (9.3)
2 or more days	280 (7.3)
Problem drinking behaviors index (SD)	0.54 (0.84)

Table 2. Bivariate Analyses Examining Factors Associated with PDB

Variable	Binge drank			Drug/alcohol use prior to last sex			Drove after drinking		
	No Mean (SD) or N(%)	Yes Mean (SD) or N(%)	p	No Mean (SD) or N(%)	Yes Mean (SD) or N(%)	p	No Mean (SD) or N(%)	Yes Mean (SD) or N(%)	p
<i>Sociodemographic variables</i>									
Age (SD)	23.93 (7.75)	22.98 (5.50)	<.001	23.64 (7.33)	24.15 (7.17)	.13	23.64 (7.33)	24.15 (7.17)	.73
Gender (%)									
Male	715 (24.1)	361 (41.1)	<.001	869 (26.3)	207 (37.8)	<.001	843 (26.3)	233 (36.5)	<.001
Female	2251 (75.9)	518 (58.9)		2429 (73.7)	341 (62.2)		2365 (73.7)	405 (63.5)	
Ethnicity (%)									
White	1416 (47.7)	647 (73.6)	<.001	1707 (51.8)	357 (65.1)	<.001	1716 (53.5)	348 (54.5)	.63
Black	1550 (52.3)	232 (26.4)		1591 (48.2)	191 (34.9)		1492 (46.5)	290 (45.5)	
Type of school (%)									
Four-year	1712 (57.7)	596 (67.8)	<.001	1964 (59.6)	345 (63.0)	.14	1850 (57.7)	459 (71.9)	<.001
Two-year	1254 (42.3)	283 (32.2)		1334 (40.4)	203 (37.0)		1358 (42.3)	179 (28.1)	
<i>Psychosocial variables</i>									
PHQ-2 (SD)	1.16 (1.30)	1.39 (1.33)	<.001	1.17 (1.30)	1.45 (1.36)	<.001	1.17 (1.30)	1.45 (1.36)	<.001
PSS-4 (SD)	5.97 (3.45)	6.48 (3.28)	<.001	6.02 (3.43)	6.47 (3.35)	.01	6.02 (3.43)	6.47 (3.35)	.02
Satisfaction with Life (SD)	22.49 (7.62)	21.63 (7.32)	.01	22.52 (7.52)	20.92 (7.53)	<.001	22.52 (7.52)	20.92 (7.53)	<.001

Table 3. Multivariate Regression Model Indicating Factors Associated with PDB Index

Variable	B	95% CI	p
Age	.01	(.00, .01)	.63
Gender			<.001
Male	Ref	--	
Female	-.18	(-.58, -.36)	
Ethnicity			<.001
White	Ref	--	
Black	-.43	(-1.44, -.61)	
Type of school			<.001
Four-year	Ref	--	
Two-year	-.21	(-.62, -.41)	
PHQ-2	.09	(.03, .13)	.001
PSS-4	-.06	(-.04, .00)	.06
Satisfaction with Life	-.09	(-.02, -.01)	.002
Ethnicity x Gender	.09	(.05, .40)	.01
Ethnicity x Type of school	.11	(.20, .54)	<.001
Ethnicity x PHQ2	-.04	(-.12, .03)	.24
Ethnicity x PSS-4	.12	(.01, .07)	.01
Ethnicity x Satisfaction with Life	.05	(-.01, .02)	.41

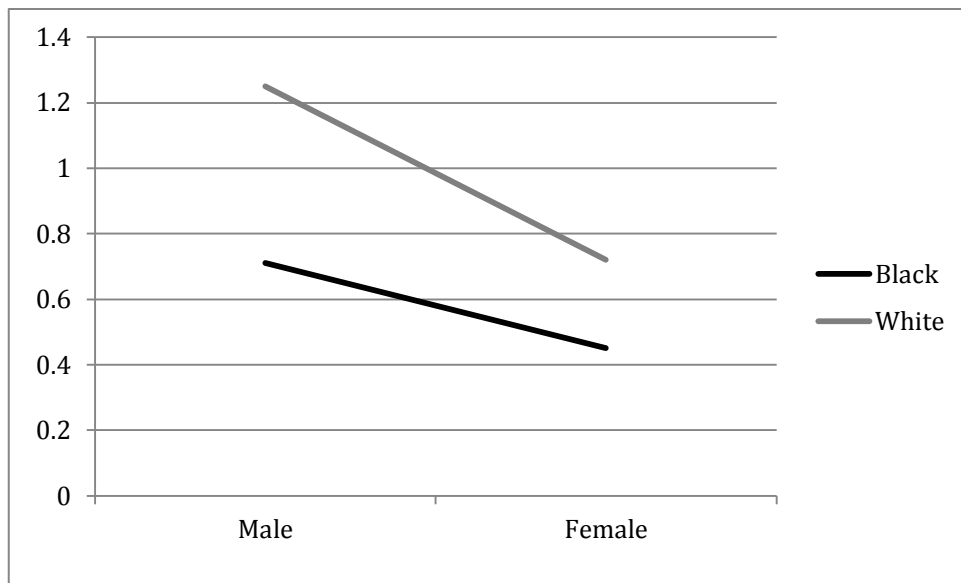
Figure 1. Interaction Between Ethnicity and Gender on PDB

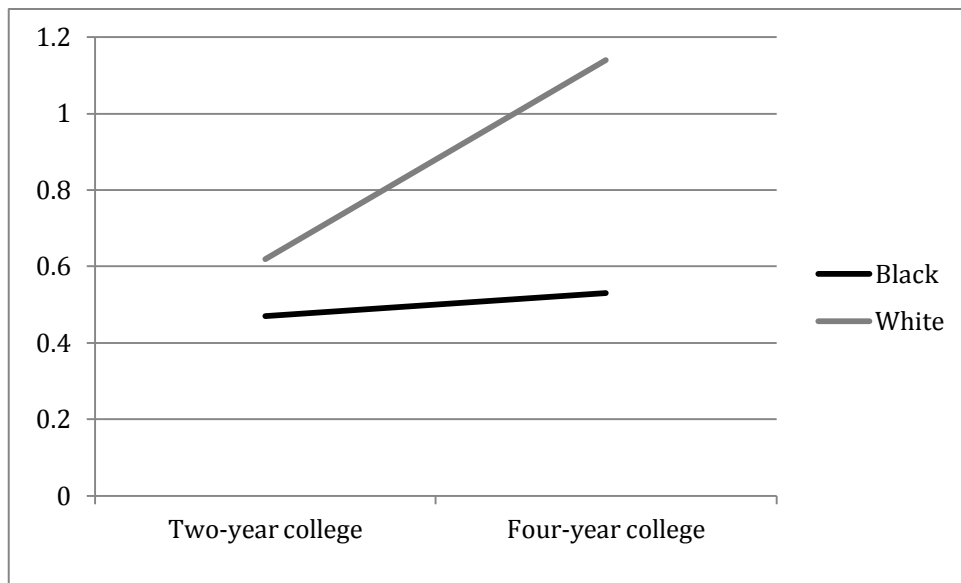
Figure 2. Interaction Between Ethnicity and Type of School Attended on PDB

Figure 3. Interaction Between Ethnicity and Perceived Stress on PDB