Confirmatory Factor Analysis of the Protective Behavioral Strategies Scale (PBSS) Across Racial Groups

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CONFIRMATORY FACTOR ANALYSIS OF THE PROTECTIVE BEHAVIORAL STRATEGIES SCALE (PBSS) ACROSS RACIAL GROUPS

By

Sasha Joy Lambert

Abstract of a Dissertation
Submitted to the Graduate School
of The University of Southern Mississippi
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ABSTRACT

CONFIRMATORY FACTOR ANALYSIS OF THE PROTECTIVE BEHAVIORAL STRATEGIES SCALE (PBSS) ACROSS RACIAL GROUPS

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Alcohol consumption among college students, and the negative alcohol-related consequences that accompany that consumption, have been consistent concerns for colleges and the general public for several decades. Protective behavioral strategies are emerging in the literature as a potentially effective means of reducing harm to students; however, psychometrically sound measures for protective behavioral strategies are only in a development stage at this point. One such measure, the Protective Behavioral Strategies Scale (PBSS), showed particular promise in this area, but previous research suffered from sample limitations, particularly very low sampling of students of color. In the current study, additional items were added to the PBSS in an attempt to improve subscale reliability, thus resulting in the PBSS-R. A confirmatory factor analysis of the measure revealed a 4-factor model best fit the data in this study. Further, the primary purpose of the current study was to test factorial validity with White, non-Hispanic and African American students. The measure was not found to be invariant across racial groups. Implications for use and directions for further research are discussed.
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CHAPTER I

REVIEW OF RELEVANT LITERATURE

Alcohol use and alcohol-related disorders have been a consistent drain on societal resources throughout history. In fact, a report issued in 2001 from the Office of National Drug Control Policy reported the societal cost of alcohol abuse in 1998 as 143.4 billion dollars. This report came following almost a decade of research and policy initiatives aimed at understanding and decreasing alcohol use and abuse in the United States. Of particular concern were the data related to college students, resulting in heavy episodic alcohol use (5 or more alcoholic beverages for men, 4 or more for women) gaining recognition as "the number one public health problem affecting college students" (Wechsler, Lee, Kuo, et al., 2002, p. 203). A 1990 study by the Carnegie Foundation for the Advancement of Teaching found that 67% of college presidents believed alcohol misuse to be a "moderate" to "major" problem on their campuses, with some presidents describing alcohol misuse "as the single greatest threat to the quality of campus life" (as cited in Presley, Meilman, & Leichliter, 2002, p. 82).

Today, it is estimated that as many as 66.6% of college students engage in heavy episodic alcohol use at least once a month (Johnston, O'Malley, Bachman, & Schulenberg, 2008), and while rates of heavy episodic alcohol use have remained relatively stable since 1993, negative alcohol-related consequences have significantly increased since that time (Wechsler, Lee, Kuo, et al, 2002). Colleges and universities are devoting significant amounts of time, money, and staff resources to attempt to educate and protect students throughout their college careers (Wechsler, Kelley, Weitzman, San
Continued research over the past several decades has enabled academic institutions to implement increasingly more effective screening and intervention strategies; however, an examination of the current literature shows a substantial need for more sensitive and specific psychometrically-sound measures (Abbey, 2002; Devos-Comby & Lange, 2008; Dowdall & Wechsler, 2002) and more skills-based and brief motivational intervention strategies (Larimer & Cronce, 2007).

**Prevalence**

A myriad of studies exist related to the prevalence of alcohol use on individual college campuses; however, the literature suggests that individual campus alcohol use is markedly variable (Colby, Colby, & Raymond, 2009) and that an examination of studies using national samples is likely to produce more representative and generalizable estimates (O’Malley & Johnston, 2002). Five national studies have provided significant insight into the prevalence of alcohol use on college campuses.

In 1976, the Monitoring the Future Study began by collecting data related to alcohol and other drug use from 17,000 high school seniors. The following year, Lloyd Johnston, the principal investigator for this study, began conducting follow-up studies each year for the following 4 years on previously surveyed seniors (thus yielding longitudinal data), including those who were full-time college students (O’Malley & Johnston, 2002). A recent report from the national study Monitoring the Future found that 83% of college students have tried alcohol, with 66.6% of students reporting alcohol use within the past 30 days (Johnston et al., 2008). In the same study, 41% of college
students reported having engaged in binge drinking at least once in the two-week period prior to being surveyed, and 4.3% reported drinking alcohol daily.

The Core Alcohol and Drug Survey was developed in 1988 in response to the U.S. Department of Education’s request to determine the direct and indirect effects of programming designed to reduce the negative consequences of substance abuse on college campuses. The core survey gathered data related to alcohol and other drug use on college campuses. The results of the 1997 survey, which included data from 93,679 students at 197 colleges and universities, found that 66.7% of students were reporting monthly alcohol use and 45.6% of students reported heavy episodic drinking (defined here as 5 or more drinks in one sitting) (Presley, Leichliter, & Meilman, 1998).

The National Survey on Drug Use and Health, formerly the National Household Survey on Drug Abuse, has annually collected data related to alcohol and other drug use on noninstitutionalized, civilian persons age 12 or older since 1991, with larger samples occurring after 1999 (O’Malley & Johnston, 2002). Results from the 2007 National Survey on Drug Use and Health, which included data from all 50 states and the District of Columbia, found that 63.7% of students reported using alcohol at least once in the past 30 days, with 43.6% of students reporting binge drinking (Substance Abuse and Mental Health Services Administration [SAMHSA], 2008). In the same study, 17.2% of students reported heavy episodic drinking five or more times in the past 30 days.

The College Alcohol Survey (CAS), begun in 1992, collected data through four national surveys of more than 100 colleges over the course of fourteen years. Henry Wechsler, the principal investigator for this study, asserted that the primary goal of the
CAS was "to learn more about the type of drinking college students engage in and the resulting consequences for themselves and for those around them" (Wechsler & Nelson, 2008, p. 1). The CAS included measures of alcohol use in the past year, drinking occasions in the past 30 days, drunken occasions in the past 30 days, and usual number of drinks per typical drinking occasion. The primary focus of the CAS was to measure "binge drinking" (defined here as five or more drinks in a row for men, 4 or more for women, on one or more occasions during the two-week period prior to being surveyed) and frequent binge drinking (binging on 3 or more occasions in the past two weeks) (Wechsler & Nelson, 2008). Results from the first CAS survey found that 44% of college students attending 4-year colleges in the United States reported binge drinking, and while this figure has remained relatively stable throughout the course of the study, there has been a trend in the "polarization of drinking behavior" (p. 493), with increases in the numbers of students choosing to abstain from alcohol use and those engaging in frequent binge drinking (Wechsler, Lee, Kuo, & Lee, 2000; Wechsler & Nelson, 2008).

In 1995, the Centers for Disease Control conducted a one-time study at 136 2- and 4-year colleges and universities. The study, named the National College Health Risk Behavior Survey, gathered data on alcohol and other drug use, as well as other health-risk behaviors (e.g., sexual behaviors, dietary behaviors, and physical activity) from 4,838 students across the United States (O’Malley & Johnston, 2002). The resulting report, which was published in 1997, found that 68% of students drank alcohol in the past month, and 42% of college students age 18-24 had engaged in heavy episodic drinking (O’Malley & Johnston, 2002).
Knight et al. (2002) conducted a study as a part of the Harvard School of Public Health College Alcohol Survey (CAS) to determine how the prevalence rates found in the study related to criteria for alcohol- and drug-related diagnoses as defined by the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV, American Psychiatric Association, 1994). They estimated that 1 in 3 college students met diagnostic criteria for alcohol abuse. Knight and colleagues further estimated that 1 in every 20 college students met criteria for a diagnosis of alcohol dependence, as did 1 in 10 male college students under the age of 24. Of note, however, is that the majority of students in this study who met criteria for alcohol abuse or dependence did not describe themselves as problem drinkers or as having an alcohol problem.

When examining all five of these studies, some data appear to be consistent across all studies. All studies report a range of 63 to 68 percent of college students using alcohol within the last 30 days, with all studies also reporting a range of 41 to 46 percent of students engaging in heavy episodic drinking in at least the past month. In fact, a systematic literature review by Sullivan and Wodarski (2004) indicated that almost half of students engaged in heavy episodic drinking, with one-fifth of students engaging in frequent heavy episodic drinking. Of interest, all studies also tended to agree that White, non-Hispanic students are more likely to engage in heavy episodic drinking than students of other ethnic backgrounds, with African American students being least likely to engage in binge drinking (O'Malley & Johnston, 2002; Presley et al., 1998; Wechsler & Nelson, 2008), although binging does occur in this population. Each study used its own sample, its own assessments, and its own methodology, and yet the data were found to be remarkably consistent across studies, suggesting that these national samples may be quite
representative and may serve as a source for comparison for future studies, especially those using a sample from only one college or university. Also of interest was the stability of prevalence rates over time. Despite data gathered at numerous points throughout the past two decades, the prevalence rates remained virtually unchanged, a trend seen throughout the literature (Sullivan & Wodarski, 2004), suggesting a relative stability over time. However, it is important to note that while prevalence rates appear consistent over time, there appears to be a qualitative shift occurring on college campuses. Drinking behavior appears to be polarizing, with greater percentages of students both choosing to abstain from alcohol entirely and choosing to engage in frequent heavy episodic drinking (Wechsler & Nelson, 2008). In sum, the results of the five national studies presented here provide convergent data for the prevalence rates of alcohol use and data supporting a relative stability of prevalence rates over time; however, while a trend toward polarization of drinking behavior has emerged, negative alcohol-related consequences have reportedly increased (Wechsler, Lee, Kuo, et al., 2002).

**Negative Alcohol-Related Consequences**

Two of the five national studies presented above also sought to gain information about negative consequences associated with alcohol use and misuse: the CAS and the Core Survey. Wechsler and Nelson (2008) reported that most negative alcohol-related consequences occur to those students who engage in heavy episodic drinking (5 or more drinks in one sitting for males, 4 or more for females), although they are quick to point out that students who report an average of fewer than four or five drinks per sitting (for
females and males, respectively) also experience negative alcohol-related consequences.

For example, in their sample, 44% of students who engaged in heavy episodic drinking reported an alcohol-related injury in the past year, but so did 53% of students who drank five or fewer drinks in one sitting (Wechsler & Nelson, 2008). Results from the CAS study suggest that college students who engage in heavy episodic drinking often experience a number of academic, social, and personal negative consequences as a result of their alcohol use. Heavy episodic drinking is associated with (a) missing classes, (b) failing behind in schoolwork, (c) having a lower grade point average (GPA), (d) engaging in unplanned sexual activity, (e) failing to use protection during sexual activity, (f) vandalism, and (g) involvement with the police (Wechsler, Lee, Kuo, et al., 2002). The same study found that students who engage in frequent heavy episodic drinking (5 or more drinks in one sitting 3 or more times in a two week period) reported experiencing five or more negative alcohol-related consequences. This suggests that alcohol use in and of itself increases the likelihood of experiencing negative alcohol-related consequences for all students, but exponentially increases the likelihood of experiencing negative alcohol-related consequences for those students who engage in binge drinking.

The Core Survey gathered data on 19 possible negative alcohol-related consequences, including items such as (a) having a hangover, (b) vomiting, (c) performing poorly on a test, (d) arguing or fighting, (e) being hurt or injured, (f) having trouble with the police, (g) having memory loss, and (h) doing something that was later regretted (Presley, et al., 1998). Having a hangover was the most frequent consequence reported with 21.7% of students reporting experiencing a hangover 6 or more times in the past year. Beyond the consequences listed above, some college students are willing to
take even greater risks when under the influence of alcohol. Slightly more than 38% of students reported doing something they later regretted at least once in the past year, 14.1% of students reported trouble with the police at least once in the past year, 32.6% reported driving a car while under the influence at least once in the past year, and 12.8% of students reported having been taken advantage of sexually at least once in the past year. However, only 10.9% of college student in the same survey thought they might have a drinking problem at least once in the past year (Presley et al., 1998).

Hingson, Heeren, Winter, and Wechsler (2005) estimated that as many as 2 million college students drove a motor vehicle after consuming five or more drinks, and 3 million college students reported riding with an intoxicated driver. The same study estimated that as many as 1,700 college students die each year from unintentional alcohol-related injuries, most in motor vehicle accidents. A report from the National Institute on Alcohol Abuse and Alcoholism (NIAAA, 2007) reported that more than 696,000 students between the ages of 18 and 24 are annually assaulted by another student who has been drinking and more than 97,000 students in that same age group are victims of alcohol-related sexual assault or date rape every year.

College students at all levels of drinking appear to experience some form of negative alcohol-related consequences, but, for those who engage in heavy episodic drinking, those consequences are more likely to be more frequent and severe. The literature suggests that despite the fact that the vast majority of college students who use alcohol experience negative alcohol-related consequences, students do not see themselves as having an alcohol problem (Knight et al., 2002; Presley et al., 1998). This may be
related to the fact that college students often tend to overestimate the number of alcoholic
drinks consumed by their peers and may reflect a view of heavy episodic drinking
behavior as normative (Baer, 2002; Bendjebar, Reidel, & Ainbinder, 2008; Martens,
Ferrier, & Cimini, 2007; Perkins, 2002).

With the extremely high prevalence of serious and sometimes fatal negative
alcohol-related consequences affecting college students at all levels of alcohol
consumption, and the low rate of students believing they have an alcohol problem, it is
easy to understand the desire many colleges and universities have to develop appropriate
screening and intervention strategies to decrease the negative consequences associated
with alcohol use.

Differences in Drinking for White, non-Hispanic and African American Students

Of interest, the national studies reviewed provide relatively little information
about differences in drinking among college students of different racial backgrounds.
Some information related to prevalence rates and consequences is reported, but
information about between group differences related to consequences and drinking
motives in college student populations is given little attention. In other words information
presented on these variables was presented as combined data rather than examined
separately across races. However, a review of regional studies provides greater insight
into these issues.

Regional studies tend to agree that African American students tend to drink less
than their White, non-Hispanic peers (Globetti, Globetti, Lo, & Brown, 1996; Humara &
Sherman, 1999; Madison-Colmore et al., 2003; Turner-Musa & Lipscomb, 2007), but there is also evidence that African American students may experience different types and levels of consequences than White, non-Hispanics. Applewhite (2006) suggests that African American students may not only experience more negative alcohol-related consequences than White, non-Hispanic students, but that they may also experience more severe consequences related to alcohol use (e.g., homicide, assault, and motor vehicle accidents). Further, some studies report that the motives behind these two groups' drinking behaviors may be quite different. Drinking behavior among African Americans is often associated with lower socio-economic status, perceived external loci of control, reactions to sexual trauma (primarily for women), and prejudice (Humara & Sherman, 1999; Madison-Colmore et al., 2003; Turner-Musa & Lipscomb, 2007). In other words, decreasing negative affect may be a more salient motivation for alcohol use for African Americans than for White, non-Hispanics.

In sum, a large percentage of all college students are using alcohol frequently and in large amounts. These students are also experiencing negative consequences as a result of their drinking. However, there appear to be racial differences in relation to use, consequences, and motivations for alcohol use. Despite the fact that African American students have consistently reported drinking less than their White, non-Hispanic peers, they are reporting experiencing more frequent and severe negative consequences than their White, non-Hispanic peers. Given these differences in prevalence and consequence patterns, it logically follows that African American and White, non-Hispanic students may also demonstrate different patterns in use of protective behavioral strategies (cognitive-behavioral strategies that can be used while drinking alcohol to reduce
negative alcohol-related consequences [Martens, Ferrier, & Cimini, 2007]), a primary reason why having valid measures to appropriately assess alcohol use and alcohol-related issues, including use of protective behavioral strategies, across racial groups is essential to further understand patterns across cultures.

Strategies to Reduce Alcohol-Related Consequences

Several general protective factors associated with varying levels of decreased risk of heavy episodic drinking in college students (e.g., familial abstinence, genetics, personality characteristics, and social and peer relationships) have been well documented in the literature (Araas & Adams, 2008; Baer, 2002; Sullivan & Wodarski, 2004). However, the problem with most of these general protective factors is that they cannot be changed for most individuals in college. Evidence suggests that environmental factors are also associated with heavy episodic drinking, such as price and availability of alcohol, legal and university regulations, and their enforcement (Baer, 2002; DeJong & Langford, 2002; Toomey & Wagenaar, 2002; Wechsler, Kuo, Lee, & Dowdall, 2000). Changes in the college environment may lead to a decrease in consumption, but these environmental changes do not represent a universal solution (i.e., no alcohol on campuses may lead to increased accidents related to off-campus socializing [Sullivan & Wodarski, 2004]) and may be met with resistance by students and the surrounding community (e.g., restaurant and bar owners), making them difficult to implement in a timely manner. There is also evidence that these approaches are not effective with students who engage in heavy episodic drinking (Wechsler, Lee, Kuo, et al. 2002). General protective factors and environmental changes, although difficult or sometimes impossible to change, have
always been a part of academic institutions' prevention and treatment strategies, but institutions also sought to develop interventions designed to reduce drinking and negative consequences for all students, regardless of potential risk factors.

Marlatt and Witkiewitz (2002) explain that disease models promoting abstinence as the only alternative to heavy episodic drinking have dominated treatment of alcohol abuse and dependence for almost 80 years. An alternative approach, harm-reduction strategies, which seek to decrease negative alcohol-related consequences through abstinence or moderation, has only surfaced over about the past 30 years. A systematic literature review conducted by Sullivan and Wodarski in 2004 suggested that many colleges and universities initially developed intervention programs operating under the assumption that heavy episodic drinking was an unavoidable part of the developmental process of students entering college. However, the focus shifted to reducing alcohol consumption following public outcry over alcohol-related consequences resulting in the deaths of students. Colleges and universities began requiring the availability of food and non-alcoholic beverage at campus functions, and administrators began hiring substance abuse specialists, developing educational programming, and placing bans on alcohol in certain places on campus (Sullivan & Wodarski, 2004). As the strong positive correlations between heavy episodic alcohol use and negative alcohol-related consequences began to emerge, and studies like the CAS were making national data sets available, researchers began attempting to gather outcome data on intervention programs (Sullivan & Wodarski, 2004).
Initially, the focus was on traditional interventions providing alcohol education rather than teaching skills for moderation of alcohol consumption. Duitsman and Cychosz (1997) reported that traditional psychoeducational interventions did not influence the behavior of college students in a meaningful way. Croom et al. (2009) recently conducted an outcome study to determine if completing a web-based alcohol education course might mitigate alcohol-related high risk behaviors. The authors concluded that, while the intervention did increase knowledge, it did not change behavior. One potential reason for this is that traditional abstinence approaches to intervention do not include motivational components to take into account that many college students do not want to change their drinking behaviors, and they do not include cognitive or behavioral skills to help students make their own educated decisions about their alcohol use (Fromme & Corbin, 2004; Fromme & Orrick, 2004; Gintner & Choate, 2007; Larimer & Cronce, 2002; Marlatt & Witkiewitz, 2002). Studies suggest that brief interventions including normative feedback may produce greater change (Chan, Neighbors, Gilson, Larimer, & Marlatt, 2007; Duitsman & Cychosz, 1997; Mun, White, & Morgan, 2009). Further, a review of treatment outcome literature suggested that harm-reduction strategies and brief interventions involving minimal contact may prove more effective at producing change than attempting to convince heavy episodic drinkers that they have an alcohol problem for which they should seek help (Sullivan & Wodarski, 2004).

With harm-reduction strategies receiving support in the literature, clinicians and researchers began working toward empirically supported brief interventions with skills-training components. Two major interventions emerged; the Alcohol Skills Training Program (ASTP) and the Brief Alcohol Screening and Intervention for College Students
Both programs stemmed from the High-Risk Drinkers (HRD) project and have evolved to intervene with college students in different ways (Marlatt & Witkiewitz, 2002). The ASTP is a skills-based group training program in which students meet weekly for 90 minutes for six to eight consecutive weeks, while BASICS is an individual intervention in which students receive assessment and feedback in 2 fifty-minute sessions. Marlatt and Witkiewitz (2002) reviewed a portion of the outcome data for the ASTP and the BASICS and found that both were effective in reducing alcohol consumption and negative alcohol-related consequences.

**Protective Behavioral Strategies (PBS)**

The relative success of these two programs led to an increased desire to develop more and better brief motivational skills-based interventions. Protective behavioral strategies are an area of relatively new interest. Protective behavioral strategies (PBS) are cognitive-behavioral strategies that can be used while drinking alcohol to decrease negative alcohol-related consequences and possibly limit alcohol consumption (Martens, Ferrier, et al., 2007). Some examples of PBS include determining not to exceed a certain number of drinks, alternating between alcoholic and nonalcoholic drinks, stopping drinking at a predetermined time, avoiding drinking games, and using a designated driver (Martens, Pedersen, LaBrie, Ferrier, & Cimini, 2007).

In 2004, Martens et al. explained that, as mentioned above, general protective factors are difficult or impossible to change, while PBS represent active strategies that can be taught through educational and intervention methods to decrease negative alcohol-related consequences. Martens and colleagues also highlight that the focus of PBS is
more on decreasing consequences than placing emphasis on limiting alcohol consumption (which may increase resistance), though it is believed that decreased consumption can likely occur when using PBS (Martens et al., 2004). Several studies have demonstrated an inverse relationship between PBS and negative alcohol-related consequences. Martens and colleagues (2004) reported that, after accounting for gender and amount of alcohol consumed, less frequent use of PBS was associated with experiencing more negative alcohol-related consequences (e.g., individuals with a PBS score of 16 were at least four times as likely to experience negative consequences than individuals with a PBS score of 32). Benton et al. (2004) drew similar conclusions from their study which examined the relationships between college student gender, alcohol consumption, negative alcohol-related consequences, and PBS. They found that men tend to report more negative alcohol-related consequences than women, who tend to report a greater use of PBS. Thus, they concluded that greater use of PBS was associated with fewer negative alcohol-related consequences. Further, Howard, Griffin, Boekeloo, Lake, and Bellows (2007) agreed with this conclusion based on their study which found that students have a repertoire of strategies similar to PBS to keep themselves and their friends safe when drinking and that students felt that these strategies did reduce negative alcohol-related consequences. The most recent study of PBS (Araas & Adams, 2008) sought to replicate the Martens et al. (2004) study using a larger national sample. The study used a retrospective design involving secondary analysis of data from the Spring 2004 NCHA. The method was almost identical to the Martens et al. (2004) study, except that an additional consequence (i.e. “had someone use force or threat of force to have sex with you”) was included in the analyses because it was endorsed by a large number of this
sample. The authors' findings were consistent with Martens and colleagues (2004). Less frequent use of PBS was associated with an increase in experiencing negative alcohol-related consequences.

This inverse relationship between PBS and negative alcohol-related consequences has also been supported by studies designed to examine PBS as a mediator or moderator for negative-alcohol related consequences and consumption. For example, in 2007, Martens, Ferrier, et al. sought to determine whether or not PBS mediated the relationship between drinking motives and alcohol consumption and negative alcohol-related consequences. Subjects were administered the Daily Drinking Questionnaire (DDQ), the Rutgers Alcohol Problem Index (RAPI), the Drinking Motives Measure (DMM), and the Protective Behavioral Strategies Scale (PBSS). The authors found that PBS mediated the relationship between motives, consumption, and consequences, but only for positively reinforcing drinking motives (e.g., drinking to enhance positive affect). The authors suggested that this was due to the direct relationship that exists between coping motives and negative alcohol-related consequences but not with alcohol consumption. In other words, negative alcohol-related consequences experienced by those who use alcohol as a coping mechanism (negatively reinforcing drinking motives – drinking to decrease negative affect) may not be related to the amount of drinking but to the underlying affect. The authors also suggested that this finding may be due to the fact that the PBS used in this study were often related to drinking with others (i.e., “have a friend let you know when you have had enough to drink,” “make sure that you go home with a friend,” etc.), whereas those with a negative affect are more likely to drink alone or isolate, thus making many of these PBS irrelevant. The authors concluded that due to the fact that college
students typically report drinking for positively reinforcing reasons, PBS are likely to
decrease negative alcohol-related consequences for most students. This relationship was
further supported when Martens et al. (2008) sought to determine if PBS might mediate
the relationship between depressive symptoms and negative consequences associated
with alcohol use. Subjects were administered the DDQ, the RAPI, the PBSS, and the
Center for Epidemiological Studies – Depression Scale (CES-D). The authors found that
depressive symptoms were related to negative alcohol-related consequences but not with
alcohol consumption and that PBS partially mediated the relationship between depressive
symptoms and negative consequences.

Larimer et al. (2007) conducted a study to determine if PBS would mediate the
relationship between a mailed-feedback intervention and alcohol consumption.
Participants were administered the Quantity/Frequency/Peak Questionnaire (QFP), the
RAPI, the Drinking Norms Rating Form (DNRF), and the NCHA. Two weeks following
the initial assessment, those who were randomly assigned to the feedback group were
mailed custom feedback based on their results. Feedback included (a) participants’
current drinking behavior, (b) their percentile rank when compared with the campus
average, (c) estimated peak and typical blood alcohol levels, (d) the effects of alcohol at
different blood alcohol levels, (e) a comparison of their perceived norms with actual
campus drinking rates, (f) their alcohol expectancies, (g) information about the negative
consequences reported, and (h) PBS they were using and could begin using. Two weeks
later, the feedback group received the first of 10 weekly generic postcards containing
alcohol education information and PBS. Students were then re-assessed after one year. At
follow-up, the authors found that students in the feedback condition used more PBS than those who did not, thus reducing consumption.

In sum, all of the studies to date demonstrated an inverse relationship between PBS and negative alcohol-related consequences, despite different types of populations. These findings across studies highlight that PBS may represent a possible strategy to reduce harm for all types of students. Limitations of these studies, though, suggest that these results be interpreted with caution. Each study was limited by a lack of standardization in scoring and measures used, and many also reported significant attrition rates. Samples primarily came from the Northeast region of the country, although one study did examine a West Coast sample (Larimer et al., 2007), one a Mid-Atlantic sample (Howard et al., 2007), and another used data from the Midwest (Benton, et al., 2004). Samples generally included relatively few students of color calling the generalizability of these results into question for this group. Reported sample demographics ranged from 64% White, non-Hispanic (Howard et al., 2007) to 85.8% White, non-Hispanic (Martens, Ferrier, et al., 2007). Authors also often cited a reliance on self-report data as a limitation. While it is always preferable to have as many types of data as possible, this may not be feasible for all studies, and recent research suggests that self-report measures of alcohol-related variables are generally reliable and valid (Babor, Steinberg, Anton, & del Boca, 2000; Miller et al., 2002). Also, as PBS has only recently been studied, it is just now becoming viewed as a unique and measurable theoretical construct. Almost no formal measures of PBS were used. The PBSS, a formal, objective measure of PBS was used in two of these studies, but it was only recently developed and needs further evidence of its reliability and validity. However, considering the increasing support for PBS as a means
of reducing negative alcohol-related consequences for college students, further analysis of the PBSS is warranted.

Differences in PBS for White, non-Hispanic and African American Students

Researchers suggest that there are differences between African American and White, non-Hispanic students in the areas of consumption, consequences, and motivation, all of which are likely to be affected by and/or to affect students’ use of PBS. For example, Martens, Ferrier, et al. (2007) suggested that there may be differences in use of PBS based on one’s motivation (e.g., positively reinforcing reasons vs. negative reinforcing reasons) for drinking. These between groups differences on various common alcohol use related variables suggests that there may likely also be differences between African American and White, non-Hispanic students related to PBS. In fact, Wallace and Muroff (2002) highlight that the risks and protective factors for alcohol and drug use are not necessarily the same for African Americans and White, non-Hispanics. Hawkins, Catalano, and Miller (1992) suggest that extreme poverty, neighborhood disorganization, and a high availability of drugs, factors which may be associated with minority populations in many areas, may place African American students at greater risk for substance abuse. Conversely, the authors also point out that factors such as a strong connection to family and an external support system that emphasizes positive values (for example, high levels of church involvement), factors often associated with traditional minority populations, can function as protective factors that help to mediate and/or moderate against poverty and other risk factors. Further, national research organizations such as the National Institute on Drug Abuse (NIDA) suggests that research on alcohol
and drug use among racial minorities, which is often plagued by the lack of appropriate 
reliability and validity estimates for individual populations, has not advanced to a point to 
allow for knowledgeable decisions about intervention (NIDA, 2003). With little 
information or ability to assess racially-specific PBS validly, related interventions would 
fall into this same category. Thus, measures are needed with construct validity in relation 
to the potentially unique alcohol use issues among African Americans.

**Protective Behavioral Strategies Scale (PBSS)**

_Measure Development_

The PBSS, originally named the Protective Behavioral Strategies Survey, was 
developed by Martens et al. (2005) in an attempt to create and validate a measure of PBS 
and to determine its relationship with alcohol-related negative consequences and alcohol 
consumption. The authors developed a 25-item measure of PBS based on a literature 
review and graduate student review. The instructions for the original 25-item PBSS are 
for the respondent to “indicate the degree to which you engage in the following behaviors 
when using alcohol or ‘partying.’” Responses were coded on a 5-point scale ranging from 
1 (never) to 5 (always). Responses were added together to produce subscale scores and a 
total score. Total scores on the PBSS range from 15 to 75. Subscale scores range from 7 
to 35 for Limiting/Stopping Drinking, from 5 to 25 for Manner of Drinking, and from 3 
to 15 for Serious Harm Reduction. A high score on this measure, total score or subscale 
score, meant a greater use of protective strategies, and a low score meant a lesser use of 
protective strategies. Participants in the initial development study were 437 
undergraduate students at a Northeastern university who reported they had consumed
alcohol in the past 30 days. The sample was 67.7% female and 79.9% White, non-Hispanic, and the mean age of participants was 19.84. Participants were administered the PBSS, a demographics questionnaire, the DDQ, and the RAPI. After removing one item due to a high positive skew related to a low endorsement, the authors conducted an exploratory factor analysis (EFA) on the PBSS.

**Exploratory Factor Analysis**

Results indicated that a 15-item scale (see Appendix A for PBSS) and a three-factor model best fit the data and accounted for 52% of the variance in the items (Martens et al., 2005). The first factor, Limiting/Stopping Drinking, accounted for 32% of the variance and included seven items related to stopping or slowing of alcohol consumption (e.g., holding a drink without drinking it). The second factor, Manner of Drinking, accounted for an additional 11% of the variance and included five items related to different ways individuals can consume alcohol (e.g., mixing different types of alcohol). The third and final factor in the model, Serious Harm Reduction, accounted for an additional 9% of the variance and included three items related to directly avoiding potentially extremely dangerous consequences (e.g., go home with a friend).

**Reliability**

Internal consistency analyses yielded alpha scores of .81, .73, and .63, for Limiting/Stopping Drinking, Manner of Drinking, and Serious Harm Reduction, respectively (Martens et al. 2005). The authors hypothesized that the low alpha value related to Serious Harm Reduction was likely due to the low number of items on that
factor (three items). Analyses of convergent validity found negative correlations with consumption variables and RAPI scores and moderate correlations between the three PBS factors, suggesting that they measure related, but distinct constructs.

Validity

Incremental validity analyses determined that PBSS did account for a significant portion of the variance in the outcome variables, consumption and consequences. Finally, hierarchical multiple regression revealed that Manner of Drinking demonstrated the strongest relationship with consumption and consequences.

Martens et al. (2005) pointed out that their findings were primarily important because they indicated that PBS may represent a unique and multifaceted construct related to alcohol consumption and negative alcohol-related consequences, suggesting that different facets of PBS may lead to different alcohol-related outcomes. Limitations of this EFA include a sample from one university with few students of color, a reliance on self-report data, and no confirmatory factor analyses, due to sample size and power limitations.

Confirmatory Factor Analysis

Following the development of the PBSS (Martens et al., 2005), Martens, Pedersen, et al. (2007) sought to conduct further psychometric evaluation on the measure to test the previously determined three-factor structure through confirmatory factor analysis (CFA). Participants in the study were 505 undergraduate students who reported alcohol use in the past 30 days from 2 different universities, one in the Northeast and one
on the West coast. Participants from the Northeast (N = 327) consisted of 27.5% volunteers and 72.5% mandated as a result of an alcohol-related campus judicial infraction. All participants from the West coast (N = 178) were volunteers. Mean age of the combined sample was 19.14 years, and the sample was 50.3% female and 74.9% White, non-Hispanic. Participants were administered a demographic questionnaire, the PBSS, and the RAPI. For this study, subjects recorded their responses to the 15-item PBSS on a 6-point scale, ranging from 1 (never) to 6 (always), and responses were added together to get subscale and total scores. (Note that Item 9 is reverse scored.) A high score on this measure was still indicative of greater use of PBS, and a low score was still indicative of lesser use of PBSS. Alcohol consumption was measured by the DDQ in the Northeast and self-report quantity/frequency items in the West. In conducting the CFA the authors included (a) model comparison (three-factor versus two-factor [Stopping/Limiting Drinking and Manner of Drinking] versus one-factor PBS) and invariance testing, (b) reliability and validity tests, and (c) hierarchical multiple regression analyses, controlling for gender and consumption, to assess the relationship between PBSS scores and negative alcohol-related consequences.

Martens, Pedersen, et al. (2007) found further support for the three-factor model from the results of the CFA, the superiority of the three-factor model to the one- or two-factor model, and the consistency of the model between student samples. All scores on the PBS subscales were correlated with outcomes as expected. Alpha levels were .82, .74, and .59, for Stopping/Limiting Drinking, Manner of Drinking, and Serious Harm Reduction, respectively. Correlations among the subscales were .35 (Manner of Drinking-Serious Harm Reduction), .41 (Stopping/Limiting Drinking-Serious Harm...
Reduction), and .60 (Manner of Drinking-Stopping/Limiting Drinking), again supporting that PBSS subscales measure related, but distinct constructs. Limitations of this study include a sample with few students of color and a reliance on self-report data.

Walters, Roudsari, Vader, and Harris (2007) conducted a study using the PBSS, scored on the 5-point scale, to examine correlates of protective behavior utilization in binge-drinking college students. A factor analysis of the PBSS conducted as a part of this study revealed a 3-factor structure best fit the data for female subjects; however, the authors found that a 4-factor solution best fit their data for male subjects. In the 4-factor model, Walters et al. (2007) suggested that the Limiting/Stopping Drinking factor should be split into a) mixing nonalcoholic drinks with alcohol (items 3, 11, and 12), and b) planned limits on drinking (items 2, 4, 6, and 10). Also in the 4-factor model, the Serious Harm Reduction factor included items 1, 7, and 8, and the Manner of Drinking factor included items 5, 9, 13, 14, and 15. See Table 1 for item loadings.
Table 1

*Item Loadings for the 4-Factor model of the PBSS (Walters et al., 2007)*

<table>
<thead>
<tr>
<th>Factor</th>
<th>PBSS Item</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mixing Nonalcoholic Drinks with Alcohol</td>
<td>3. Alternate alcoholic and nonalcoholic drinks</td>
</tr>
<tr>
<td></td>
<td>11. Drink water while drinking alcohol</td>
</tr>
<tr>
<td></td>
<td>12. Put extra ice in your drink</td>
</tr>
<tr>
<td>Planned Limits on Drinking</td>
<td>2. Determine not to exceed a set number of drinks</td>
</tr>
<tr>
<td></td>
<td>4. Have a friend let you know when you have had enough to drink</td>
</tr>
<tr>
<td></td>
<td>6. Leave the bar/party at a predetermined time</td>
</tr>
<tr>
<td></td>
<td>10. Stop drinking at a predetermined time</td>
</tr>
<tr>
<td>Manner of Drinking</td>
<td>5. Avoid drinking games</td>
</tr>
<tr>
<td></td>
<td>9. Drink shots of liquor</td>
</tr>
<tr>
<td></td>
<td>13. Avoid mixing different types of alcohol</td>
</tr>
<tr>
<td></td>
<td>14. Drink slowly, rather than gulp or chug</td>
</tr>
<tr>
<td></td>
<td>15. Avoid trying to “keep up” or “out-drink” others</td>
</tr>
<tr>
<td>Serious Harm Reduction</td>
<td>1. Use a designated driver</td>
</tr>
<tr>
<td></td>
<td>7. Make sure that you go home with a friend</td>
</tr>
<tr>
<td></td>
<td>8. Know where your drink has been at all times</td>
</tr>
</tbody>
</table>

Although the authors do propose these factor loadings, they do point out that items 2 and 8 loaded most heavily on the Manner of Drinking factor, but load best from a theoretical perspective on planned limits on drinking (2. “determined not to exceed a set number of drinks”) and Serious Harm Reduction (8. “knew where your drink had been at all times”), respectively. Limitations of this study include a small, homogeneous sample (85% White, non-Hispanic), artificially dichotomized scores, and a nonstandardized set of PBS.
In sum, results presented by these researchers provide support for PBS as a measurable construct related to alcohol outcome variables, and these data suggest that the subscales do measure related, but distinct constructs within PBS. Further, numerous researchers suggest that the PBSS has potential as a measure of protective behavioral strategies. Limitations of these studies, particularly related to the samples (few students of color from three regions of the country), suggest that further psychometric analyses are warranted before this measure can be used to provide reliable and valid data of PBS use among diverse group.

Reliability and Validity Concerns for the PBSS

While the PBSS does appear, at least initially, to be a promising measure for further study of protective behavioral strategies, the limitations of the measure, particularly related to current psychometric properties of one subscale, Serious Harm Reduction, is a concern. Additionally, given the discussion above about differences between White non-Hispanic and African American students in the amount of alcohol consumed, negative consequences experienced, and use of protective factors highlights additional areas to address in the development of a reliable and valid assessment of PBS.

In the initial development study for the PBSS (Martens, Ferrier, et al., 2005), an internal consistency value reported for the SHR subscale was .63. The initial CFA of the measure (Martens, Pedersen, et al., 2007) reported an internal consistency value for the SHR scale as .59. A second CFA of the measure (Walters, Roudsari, Vader, & Harris, 2007) reported an internal consistency value of .63, and a fourth study (Martens et al., 2008) reported an internal consistency value of .67. In short, internal consistency
reliabilities for the SHR scale range from .59 to .67 in these studies, and all studies report that this low value is likely related to the small number of items included on that scale (3 items). The low internal consistency values of the SHR subscale are of concern, as .70 is considered the minimal acceptable value to demonstrate adequate internal consistency reliability (Nunnally, 1978). Internal consistency values determine the extent to which items on a particular scale are interrelated (Grimm & Yarnold, 2000). The goal is to for items on a particular subscale to be related to the same latent construct, but to not be entirely redundant. The low internal consistency values found for the SHR subscale suggest that the items may not be sufficiently closely related to provide accurate measurement of the latent construct of Serious Harm Reduction, as defined by the PBSS.

In order to provide psychometric data for the PBSS to be used appropriately with populations of color, construct validity must also be assessed. Construct validity is important to consider in a research measure because determining what psychological constructs of interest account for variance in test performance is essential to making inferences based on test scores (Cronbach & Meehl, 1955). Further, when examining variables within a cross cultural framework it is vital to determine which aspects of behavior are specific to a culture and which parts of behavior are general across cultures (Cokley & Awad, 2008). As such, to provide support for the construct validity of a measure, it is important to show that the same constructs are measured in the same way and at the same levels across different groups, otherwise the measure could be considered biased (Brown, 2006; Crocker & Algina, 2006). One way to assess construct validity across groups is through the use of multiple-group confirmatory factor analysis. Multiple groups confirmatory factor analysis is designed to test whether two groups, in this case a
majority and a minority group, exhibit the same underlying factor structure for a particular construct (Brown, 2006; Bryant & Yarnold, 1995), thus providing support for or against the construct validity of a particular measure. Based on the apparent differences between African American and White, non-Hispanic students in the areas of consumption, consequences, and motivations as described earlier, and African American’s and White, non-Hispanic’s potential differences in the use of PBS, a multi-group CFA is warranted to determine if the PBSS has adequate construct validity with African American students.

Purpose of the Present Study

College students appear to be at great risk for negative alcohol-related consequences as a result of frequent and often heavy alcohol consumption. As concern grows over the seriousness and pervasiveness of alcohol use and negative consequences, colleges and universities have sought to create intervention and treatment programming to attempt to curb some of these consequences. As research has shown, harm-reduction strategies are often associated with better outcomes than abstinence strategies on college campuses, particularly when combined with feedback. PBS are intuitive, easy to teach, well-suited to feedback interventions, and may represent a potentially valuable addition to intervention and prevention programs already taking place on college and university campuses. Research indicates that the PBSS (Martens et al. 2005) has great potential for providing students with valuable information about strategies they can use to reduce harm, but this measure is still in its infancy. Further psychometric analyses with different populations could provide much needed information about this measure.
The primary purpose of the current study was a psychometric evaluation of the PBSS via confirmatory factor analysis of the PBSS using a sample from a public university in the Southeastern United States with particular emphasis on students of color. This study also assessed alcohol consumption and rates of negative alcohol-related consequences on this campus. As such this study tried to answer the following questions.

**Question 1:** What are the characteristics of alcohol consumption on this campus?

**Question 2:** What are the characteristics of negative alcohol-related consequences on this campus?

**Question 3:** Are the factor structure and measurement characteristics of the PBSS invariant across White, non-Hispanic and African American student populations? This was be assessed through multi-group confirmatory factor analysis. Specifically, it was hypothesized that the CFA would:

- **A:** Confirm the presence of a three-factor structure (Limiting/Stopping Drinking, Manner of Drinking, and Serious Harm Reduction) for White, non-Hispanic students.

- **B:** Confirm the presence of a three-factor structure (Limiting/Stopping Drinking, Manner of Drinking, and Serious Harm Reduction) for both White, non-Hispanic and African American students.

- **C:** Demonstrate invariance of the PBSS factor loadings across White, non-Hispanic and African American samples.
D: Demonstrate that factor variances-covariances on the PBSS will be equivalent across groups.
CHAPTER II

METHOD

Participants

Participants were 616 undergraduate students from a large minority-serving institution in the Southern United States. Seventy-eight students were omitted from further analysis based on age (outside the 18 to 25 range). Further, as the purpose of the study is to examine differences between African American (AA) and White, non-Hispanic students (WNH), participants who did not identify as such were also omitted from further analysis (N = 40). Finally, 54 students were omitted from further analysis due to surveys with 25% or more missing data on the PBSS, the primary measure of interest. This resulted in a final sample of 444 students for this study.

Participants included students who identified as White, non-Hispanic or African American between the ages of 18 and 25 years ($X = 20.4, SD = 1.78$), age range for traditional college students, who reported having used alcohol at least once in the past 30 days. To ensure adequate power for analyses, five participants were needed for each estimated parameter (Bryant & Yarnold, 1995). As a CFA of this size contained approximately 36 estimated parameters, at least 195 participants were needed per group. This study included 249 students identifying as White, non-Hispanic (WNH) and 195 students identifying as African American (AA) (56.1% WNH, 43.9% AA). The sample for this study was overwhelmingly female, consisting of 360 females and 84 males (81.1% female, 18.9% male). The sample can be further described using both gender and
ethnicity, thus consisting of 193 WNH females (43.5%), 167 AA females (37.6%), 56 WNH males (12.6%), and 28 AA males (6.3%).

Of the 444 included in the final sample, 18.9% identified as freshman, 27.3% identified as sophomores, 25.0% identified as juniors, and 27.3% identified as seniors. Twenty-five percent reported having attended a junior college before entering the university. Full-time students comprised 96.4% of the sample. On and off-campus housing was relatively equivalent in this sample, with 48.5% living on campus and 50.0% living off campus. Greek students made up 18.5% of the sample, while athletes made up 8.6%. Most participants were currently unemployed (52.5%). Further, 10.2% of this sample reported having been in trouble with the university or the legal system as a result of their drinking (2.3% and 7.9%, respectively).

Instruments

Demographic Questionnaire. Participants were asked to complete a demographics questionnaire which included information about gender, ethnicity, age, height, weight, year in school, enrollment status, and employment status. See Appendix B. The demographics form could be completed in 5 minutes.

Daily Drinking Questionnaire (DDQ). A modified version of the DDQ was used to assess alcohol consumption among college students. The DDQ asks students to report the typical number of drinks they have consumed on each day of the week for the past month (Collins, Parks, & Marlatt, 1985). It also asks students for the typical number of hours they drank on each day of the week for the past month. The DDQ is widely used
with college students and is considered to be a reliable and valid measure of alcohol consumption (Martens et al., 2005). The DDQ can be completed in 3 minutes. See Appendix B for the DDQ.

Young Adult Alcohol Problems Screening Test – Brief Version (YAAPST). The YAAPST is a 20-item measure designed to assess the frequency with which college students experience certain negative alcohol-related consequences (Hurlbut & Sher, 1992). This questionnaire includes items to assess (a) alcohol tolerance, (b) withdrawal, (c) acute effects of alcoholism (i.e., hangover, blackout, upset stomach), (d) damaged self esteem, (e) role failure, (f) social/interpersonal problems, (g) legal problems, and (h) hazardous situations. The questionnaire assesses both lifetime prevalence and prevalence in the past 12 months and a weighted score that includes weights based on the number of times a consequence was experienced. Participants answer items in a forced-choice format from a list of frequency options, and weighted scoring is used to obtain total scores by adding the score for each item. Responses for the first 6 items are scored on a 10-point scale, ranging from 0 (no, never) to 9 (yes, 40 or more times). Responses for items 7 through 20 are scored on a 5-point scale, ranging from 0 (never) to 4 (yes, 3 or more times). Weighted scores on this measure can range from 0 to 110. It is important to note that the purpose of the YAAPST is to identify problems, not to diagnose problems (Walters & Baer, 2006). As such, this measure generally does not have a “cut off” score. Higher scores on the YAAPST indicate a greater frequency of experiencing negative consequences and a greater impact of negative consequences on the participant’s life (Hurlbut & Sher, 1992). Internal consistency for past year consequences for the original YAAPST was found to be .83 and for lifetime consequences was found to be .87 (Devos-
Comby & Lange, 2008). Internal consistency for lifetime prevalence in this sample was .87. The YAAPST can be completed in 3-5 minutes (Walters & Baer, 2006). See Appendix B for the YAPPST.

Protective Behavioral Strategies Scale (PBSS) – Revised. The PBSS is a 15-item scale designed to assess the degree to which students engage in certain behaviors which may decrease the likelihood of negative alcohol-related consequences (PBSS, Martens et al., 2005). Students are asked to “indicate the degree to which you engage in the following behaviors when using alcohol or ‘partying,’” on a 6-point scale ranging from 1 (never) to 6 (always) (See Appendix A for the PBSS). The PBSS is scored by summing responses (item 9 is reverse scored) to obtain subscale scores and a total score. Total scores on the PBSS range from 15 to 90. Subscale scores range from 7 to 42 for Limiting/Stopping Drinking, from 5 to 30 for Manner of Drinking, and from 3 to 18 for Serious Harm Reduction. High scores on this measure signify greater use of PBS, while low scores signify lesser use of PBS. Results from an EFA (Martens et al., 2005) and a CFA (Martens, Pederson, et al., 2007) indicate that the PBSS will yield scores for three factors, Limiting/Stopping Drinking, Manner of Drinking, and Serious Harm Reduction. Internal consistency alpha levels for the EFA (Martens et al., 2005) and the CFA (Martens, Pederson, et al., 2007) ranged from .81 to .82 for Limiting/Stopping Drinking, .73 to .74 for Manner of drinking, and .59 to .63 for Serious Harm Reduction, respectively.

Due to the concern regarding the low alpha levels for the SHR subscale, additional items were generated for the current study based on a review of relevant PBS
literature and of the national alcohol studies reviewed earlier in this document. Further, additional items were also generated independently by two alcohol researchers. This process resulted in a list of 25 items hypothesized to relate to serious harm reduction when drinking alcohol. These items were then rated for relevance to serious harm reduction by 5 national experts in the field of college student alcohol use and prevention. The experts were provided with the Martens et al. (2005) definition of the serious harm reduction subscale and the current items that comprise the subscale. Experts were then instructed to indicate the degree to which they felt that each of the items related to the Serious Harm Reduction subscale using a 4-point scale, where 1 = Not Relevant, 2 = Mildly Relevant, 3 = Moderately Relevant, and 4 = Very Relevant). See Appendix C for the Expert Questionnaire. Ratings were analyzed, and items which received a mean rating of 3.6 or higher (items 3. Avoid getting in a car with someone who has been drinking, 5. Avoid mixing alcohol with prescription drugs (whether prescribed for you or not), and 10. Always know what you are drinking in Appendix C) were included in the final revised questionnaire. The addition of these 3 items resulted in internal consistency values of above .70 for all 3 subscales, the specifics of which will be described in the results sections of this document. See Appendix A for the PBSS. The PBSS can be completed in 15 minutes.

Procedure

Participants were provided with a brief overview of the study and were given the option to participate using the Department of Psychology’s research website (www.experimetrix.com/usm), which enables students to earn class credit for voluntary
participation in research studies. Participants were also recruited through a mass email with a weblink to the study through the University’s announcement listserves; further, in an effort to oversample for African American students, a mass email with a weblink to the study was sent to 5 African American student organizations on campus. All data were collected online via SurveyMonkey and were accessible through a link from the Department of Psychology’s research website (www.experimetrix.com/usm) or through a link provided in a mass email. This study, which is a part of a larger study occurring at the University, was open to all undergraduate students ages 18 to 25 (age for traditional college age students); however, only students identifying as White, non-Hispanic or African American who reported having used alcohol at least once in the past 30 days were included in this study due to the specific focus on these two groups.

Participants were provided with an online version of the consent form (see Appendix D), which they had to read and electronically sign using their University ID number before proceeding to the questionnaire. The consent form explained that participants were being asked to participate in a research project which investigates the relationships between alcohol consumption, negative alcohol-related consequences, and protective behavioral strategies. The consent form also outlined any risks and benefits that may have resulted from participation in the study. Additionally, the consent form advised potential participants that the study would take approximately 60 minutes and would be worth 2 research credits for those seeking psychology research credit. The consent form also explained that students who were not seeking psychology research credit would be entered into a drawing to win 1 of 12 $5 gift cards to their choice of either the campus bookstore, campus dining, or the campus coffee shop. Furthermore, the
consent form advised potential participants that participation in the study was voluntary and that the participant could withdraw from the study at any time without penalty or prejudice. Participants were also provided with the researcher’s contact information.
CHAPTER III

RESULTS

Preliminary Analyses

Participants included 444 students who identified as White, non-Hispanic or African American between the ages of 18 and 25 years, who reported having used alcohol at least once in the past 30 days. This sample was 56.1% White, non-Hispanic (WNH), 43.9% African American (AA), 81.1% female, and 18.9% male. Data were downloaded from Surveymonkey and converted to an SPSS file and a LISREL 8.80 file (Jöreskog & Sörbom, 2006) to allow for appropriate data analyses. Raw data were examined for missing items, and cases missing more than 25% of PBSS data were deleted from further analyses. The race variable was examined and non-African American or White, non-Hispanic participants were excluded from further analysis.

Responses to the DDQ were used to determine standard drinks per week and per month for this sample. The average number of standard drinks per week was 9.7 (SD=18.4) with an average of 41.6 standard drinks per month (SD=79.0). Of note, 4 participants reported an unusually high number of drinks per week, over 3 standard deviations above the mean. After reviewing the data for these participants, it is believed that they may have made an error in entering their data, as they each reported over 60 drinks per day at some point on the DDQ, resulting in number of drinks per week exceeding 100 and, in one case, exceeding 200. When these 4 cases were removed, the average number of standard drinks per week was 8.2 (SD=10.8), and the average number
of standard drinks per month was 35.4 (SD=46.3). With regard to gender, men tended to drink more than women, averaging 13.7 drinks per week compared to 8.7 drinks per week for women (F (1, 377) = 4.49, p < .05, d = 0.27). WNH participants tended to drink more than their AA counterparts, averaging 10.2 drinks per week compared to 5.7 drinks per week for AA students (t(372.18) = -4.19, p < .01, d = 0.43).

Table 2

*Number of Standard Drinks per Week and per Month as Determined by the DDQ*

<table>
<thead>
<tr>
<th>Group</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Sample</td>
<td>375</td>
<td>8.2</td>
<td>10.8</td>
<td>35.4</td>
<td>46.3</td>
</tr>
<tr>
<td>Females</td>
<td>305</td>
<td>8.7</td>
<td>17.9</td>
<td>37.4</td>
<td>77.0</td>
</tr>
<tr>
<td>Males</td>
<td>74</td>
<td>13.7</td>
<td>19.7</td>
<td>59.0</td>
<td>84.9</td>
</tr>
<tr>
<td>WNH</td>
<td>211</td>
<td>10.2</td>
<td>11.8</td>
<td>43.7</td>
<td>50.7</td>
</tr>
<tr>
<td>AA</td>
<td>164</td>
<td>5.7</td>
<td>8.7</td>
<td>24.6</td>
<td>37.5</td>
</tr>
<tr>
<td>WNHF</td>
<td>128</td>
<td>11.6</td>
<td>23.8</td>
<td>49.9</td>
<td>102.6</td>
</tr>
<tr>
<td>WNHM</td>
<td>45</td>
<td>16.4</td>
<td>21.4</td>
<td>70.4</td>
<td>92.2</td>
</tr>
<tr>
<td>AAF</td>
<td>140</td>
<td>5.8</td>
<td>11.9</td>
<td>24.9</td>
<td>51.1</td>
</tr>
<tr>
<td>AAM</td>
<td>25</td>
<td>10.3</td>
<td>17.3</td>
<td>44.4</td>
<td>74.5</td>
</tr>
</tbody>
</table>

N=number of subjects, SD=standard deviation, WNH=White, non-Hispanic, AA=African American, WNHF=White, non-Hispanic females, WNHM=White, non-Hispanic males, AAF=African American females, AAM=African American males

*Amount of Alcohol Consumed*

Results from the DDQ also indicated that this sample reported slightly lower rates of binge drinking, defined here as 4 or more drinks in one sitting for women and 5 or more drinks in one sitting for men (Wechsler & Nelson, 2008), than the national sample. A total of 37.9% of this sample reported having binged in the past month, while
nationally an average of 42% of college students report having binged over the past month (O’Malley & Johnston, 2002). The percentage of women in this sample reporting having binged at least once in the previous month was 39.7%, while 29.6% of men reported having binged in that same time period. When examined by ethnic group, 51.9% of White, non-Hispanic (WNH) students reported having binged in the past month, and 24.2% of African American students reported having binged in that time period.

**Negative Consequences Experienced**

Results from the YAAPST indicated that students in this sample are experiencing a noteworthy level of negative alcohol-related consequences as a result of their alcohol use. Raw scores on this measure ranged from 0 to 71 (scores can range from 0 to 110), indicating that students in this sample reported experiencing a wide range of negative consequences. The average YAAPST score for this sample was 11.3 (SD=10.9), indicating that students in this sample are experiencing at least one consequence repeatedly. Having a headache or hangover the morning after drinking was the most frequently endorsed consequences (77%), with having felt sick to one’s stomach or having thrown up after drinking being the second most frequently endorsed consequence (75%). Alarmingly, having driven when one knew one had too much to drink was the third most commonly endorsed consequences, with 45% of students reporting ever having experienced this consequence and 19.6% reporting having experienced this consequence two or more times. See Table 3 for YAAPST item means.
Table 3

Means and Standard Deviations for YAAPST Items

<table>
<thead>
<tr>
<th>YAAPST Item</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. driving under the influence</td>
<td>1.26</td>
<td>1.86</td>
</tr>
<tr>
<td>2. headache/hangover</td>
<td>2.88</td>
<td>2.47</td>
</tr>
<tr>
<td>3. sick to your stomach/thrown up</td>
<td>2.47</td>
<td>2.19</td>
</tr>
<tr>
<td>4. physical fights</td>
<td>0.29</td>
<td>0.93</td>
</tr>
<tr>
<td>5. trouble at work/school</td>
<td>0.12</td>
<td>0.52</td>
</tr>
<tr>
<td>6. fired/suspended/expelled</td>
<td>0.04</td>
<td>0.36</td>
</tr>
<tr>
<td>7. problems with partner/family member</td>
<td>0.63</td>
<td>1.23</td>
</tr>
<tr>
<td>8. lost friends</td>
<td>0.13</td>
<td>0.56</td>
</tr>
<tr>
<td>9. neglected obligations 2+ consecutive days</td>
<td>0.24</td>
<td>0.76</td>
</tr>
<tr>
<td>10. regrettable sexual situations</td>
<td>0.72</td>
<td>1.16</td>
</tr>
<tr>
<td>11. arrested for driving under the influence</td>
<td>0.07</td>
<td>0.35</td>
</tr>
<tr>
<td>12. had the “shakes”</td>
<td>0.18</td>
<td>0.70</td>
</tr>
<tr>
<td>13. needed a drink upon waking</td>
<td>0.15</td>
<td>0.61</td>
</tr>
<tr>
<td>14. needed larger amounts of alcohol</td>
<td>0.68</td>
<td>1.27</td>
</tr>
<tr>
<td>15. felt dependent upon alcohol</td>
<td>0.27</td>
<td>0.83</td>
</tr>
<tr>
<td>16. felt guilty about drinking</td>
<td>0.85</td>
<td>1.34</td>
</tr>
<tr>
<td>17. doctor expressed concern about drinking</td>
<td>0.11</td>
<td>0.55</td>
</tr>
<tr>
<td>18. gone to someone for help with drinking</td>
<td>0.07</td>
<td>0.39</td>
</tr>
<tr>
<td>19. attended AA meeting</td>
<td>0.05</td>
<td>0.38</td>
</tr>
<tr>
<td>20. sought professional help for drinking</td>
<td>0.07</td>
<td>0.43</td>
</tr>
</tbody>
</table>

Scores for items 1-6 can range from 0 to 9. Scores for items 7-20 can range from 0 to 4.

As seen by the group YAAPST scores presented in Table 4, men and women in this study reported no statistically significant differences in levels of consequences ($F(1, 90.46) = 2.61, p = .11, d = 0.24$), with raw scores of 13.4 and 10.7, respectively. Also, WNH students reported significantly higher levels of consequences ($\bar{X} = 14.1$) than did AA students ($\bar{X} = 7.8$) ($t(317.59) = -5.62, p < .01, d = 0.63$).
Table 4

YAAPST Raw Scores by Group

<table>
<thead>
<tr>
<th>Group</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Sample</td>
<td>347</td>
<td>11.3</td>
<td>10.9</td>
</tr>
<tr>
<td>Females</td>
<td>280</td>
<td>10.7</td>
<td>10.5</td>
</tr>
<tr>
<td>Males</td>
<td>67</td>
<td>13.4</td>
<td>12.3</td>
</tr>
<tr>
<td>WNH</td>
<td>190</td>
<td>14.1</td>
<td>12.3</td>
</tr>
<tr>
<td>AA</td>
<td>157</td>
<td>7.8</td>
<td>7.6</td>
</tr>
<tr>
<td>WNHF</td>
<td>144</td>
<td>13.8</td>
<td>12.0</td>
</tr>
<tr>
<td>WNHM</td>
<td>46</td>
<td>14.8</td>
<td>13.3</td>
</tr>
<tr>
<td>AAF</td>
<td>113</td>
<td>7.5</td>
<td>7.3</td>
</tr>
<tr>
<td>AAM</td>
<td>15</td>
<td>10.2</td>
<td>9.2</td>
</tr>
</tbody>
</table>

N=number of subjects, SD=standard deviation, WNH=White, non-Hispanic, AA=African American, WNHF=White, non-Hispanic females, WNHM=White, non-Hispanic males, AAF=African American females, AAM=African American males

In sum, prevalence rates of drinking in this sample appear to be close to national samples, although they are slightly lower. As expected, men in this sample tended to drink more than women, and WNH students tended to drink more than AA students. With regard to consequences, students in this sample appear to be experiencing a wide range of negative alcohol-related consequences relatively frequently. Men and women tended to experience similar levels of negative consequences, and WNH students tended to experience greater negative consequences than AA students. Results of between group comparisons for WNH and AA students were somewhat different than what was expected based upon the literature which explains that WNH students are more likely to drink significantly more than AA peers, but that AA peers are more likely to experience more
frequent and severe negative alcohol-related consequences. This discrepancy may be representative of the fact that WNH students are drinking almost double what AA students are drinking, suggesting that amount of alcohol consumed may trump the levels of consequences usually expected based upon racial differences. Results of between group comparisons for males and females were also somewhat different than expected considering females tended to drink less than males, but experience similar levels of consequences. This may relate to the high percentage of females who reported binge drinking in this study (39.7%), compared to 29.6% of males. While the average number of drinks for women has consistently remained lower than the average number of drinks for men, a greater percentage of women may be bingeing, resulting in more equivalent levels of consequences for men and women.

The PBSS data was obtained for the total sample (N=444). As mentioned previously, 3 items were added to the SHR subscale of the measure in an attempt to provide greater internal consistency for this subscale. These items became items 16, 17, and 18 on the now revised measure, the PBSS-R. See Appendix E for the PBSS-R. Item means, standard deviations, and inter-item correlations for the PBSS-R are presented in Table 5.
Table 5

Protective Behavioral Strategies Scale – Revised Item Means, Standard Deviations and Inter-item Correlations

<table>
<thead>
<tr>
<th>Item</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
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<tr>
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<tr>
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<td>.30</td>
<td>.27</td>
<td>.36</td>
<td>.49</td>
<td>.50</td>
</tr>
</tbody>
</table>

-
From this point forward, all analyses were conducted with the PBSS-R, not the original PBSS (Martens et al., 2005). Internal consistencies for the PBSS-R for the 3-Factor model were .85 for LSD, .75 for MOD, and .83 for SHR. Walters et al. (2007) proposed a 4-Factor model which was also tested with the PBSS-R. Internal consistency alpha levels were .71 for Mixing Nonalcoholic Drinks with Alcohol (MND), .83 for Planned Limits on Drinking (PLD), .75 for MOD, and .83 for SHR. Further, internal consistency alpha levels for WNH students were .66 for MND, .83 for PLD, .73 for MOD, and .85 for SHR. These alpha levels for AA students in this sample were .75 for MND, .83 for PLD, .77 for MOD, and .66 for SHR. Similar to other PBSS research, which has consistently shown an inverse relationship between PBS and negative alcohol-related consequences and between PBS and alcohol consumption, construct validity of the PBSS-R was supported by the significant negative correlation between total PBSS-R scores and total YAAPST scores ($r = -.46, p = .01$) and by a significant negative correlation between total PBSS-R scores and DDQ standard drinks per month ($r = -.25, p = .01$). Means and standard deviations were obtained for the PBSS-R Total score and 4 Subscale scores. These are presented in Table 6.
Table 6

*Means and Standard Deviations for PBSS-R Total and Subscale Scores*

<table>
<thead>
<tr>
<th>Group</th>
<th>Total</th>
<th>MND</th>
<th>PLD</th>
<th>MOD</th>
<th>SHR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Sample</td>
<td>M=76.8</td>
<td>M=10.2</td>
<td>M=15.2</td>
<td>M=20.3</td>
<td>M=31.2</td>
</tr>
<tr>
<td></td>
<td>SD=17.1</td>
<td>SD=4.1</td>
<td>SD=5.5</td>
<td>SD=5.7</td>
<td>SD=5.8</td>
</tr>
<tr>
<td>Females</td>
<td>M=77.6</td>
<td>M=10.3</td>
<td>M=15.3</td>
<td>M=20.6</td>
<td>M=31.5</td>
</tr>
<tr>
<td></td>
<td>SD=17.2</td>
<td>SD=4.2</td>
<td>SD=5.7</td>
<td>SD=5.7</td>
<td>SD=5.6</td>
</tr>
<tr>
<td>Males</td>
<td>M=73.3</td>
<td>M=9.8</td>
<td>M=14.9</td>
<td>M=19.0</td>
<td>M=29.7</td>
</tr>
<tr>
<td></td>
<td>SD=16.4</td>
<td>SD=3.8</td>
<td>SD=4.9</td>
<td>SD=5.3</td>
<td>SD=6.5</td>
</tr>
<tr>
<td>WNH</td>
<td>M=76.9</td>
<td>M=10.2</td>
<td>M=14.8</td>
<td>M=20.1</td>
<td>M=32.0</td>
</tr>
<tr>
<td></td>
<td>SD=15.9</td>
<td>SD=4.1</td>
<td>SD=5.2</td>
<td>SD=5.5</td>
<td>SD=4.8</td>
</tr>
<tr>
<td>AA</td>
<td>M=76.6</td>
<td>M=10.2</td>
<td>M=15.8</td>
<td>M=20.6</td>
<td>M=30.1</td>
</tr>
<tr>
<td></td>
<td>SD=18.6</td>
<td>SD=4.1</td>
<td>SD=5.9</td>
<td>SD=5.9</td>
<td>SD=6.9</td>
</tr>
<tr>
<td>WNHF</td>
<td>M=77.7</td>
<td>M=10.3</td>
<td>M=14.7</td>
<td>M=20.4</td>
<td>M=32.3</td>
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<tr>
<td></td>
<td>SD=16.2</td>
<td>SD=4.3</td>
<td>SD=5.4</td>
<td>SD=5.5</td>
<td>SD=4.4</td>
</tr>
<tr>
<td>WNHM</td>
<td>M=74.1</td>
<td>M=9.7</td>
<td>M=14.8</td>
<td>M=18.9</td>
<td>M=30.8</td>
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<td>SD=14.8</td>
<td>SD=3.4</td>
<td>SD=4.7</td>
<td>SD=5.3</td>
<td>SD=5.6</td>
</tr>
<tr>
<td>AAF</td>
<td>M=77.5</td>
<td>M=10.2</td>
<td>M=15.9</td>
<td>M=20.9</td>
<td>M=30.6</td>
</tr>
<tr>
<td></td>
<td>SD=18.4</td>
<td>SD=4.1</td>
<td>SD=6.0</td>
<td>SD=5.9</td>
<td>SD=6.7</td>
</tr>
<tr>
<td>AAM</td>
<td>M=71.6</td>
<td>M=9.9</td>
<td>M=15.0</td>
<td>M=19.3</td>
<td>M=27.5</td>
</tr>
<tr>
<td></td>
<td>SD=19.2</td>
<td>SD=4.5</td>
<td>SD=5.3</td>
<td>SD=5.5</td>
<td>SD=7.6</td>
</tr>
</tbody>
</table>

MND = Mixing non-alcoholic drinks with alcohol, PLD = planned limits on drinking, MOD = manner of drinking, SHR = serious harm reduction, WNH = White, non-Hispanic, AA = African American, WNHF = White, non-Hispanic females, WNHM = White, non-Hispanic males, AAF = African American females, AAM = African American Males

Total scores on the PBSS-R can range from 18 to 108, while subscale scores can range from 3 to 18 for MND, from 4 to 24 for PLD, from 5 to 30 for MOD, and from 6 to 36 for SHR. First, it appears that students in this sample are using a wide range of PBS
relatively frequently. Total scores, MND scores, PLD scores, and MOD scores average to slightly over the mean possible score for that scale. SHR scores were closer to the maximum score for that subscale. This is promising considering these PBS represent strategies that can reduce the most severe negative alcohol-related consequences (Martens et al., 2005). As expected, women on average tended to use more PBS than men ($F(1, 421) = 4.22, p < .05, d = 0.26$). Based on the fit of the model across racial groups on the PBSS-R (which will be described below), no formal comparisons between WNH and AA students were made. Mean scores and standard deviations are provided here solely for descriptive purposes.

Confirmatory Factor Analyses

A CFA is warranted when theory or previous analyses of a measure have yielded a proposed factor model, because a CFA directly tests the fit of the data to a specific factor model (Bryant & Yarnold, 1995). The CFA sought to determine what factor model best fit with the data in the current sample.

Often, a CFA will compare the proposed model to other theoretically plausible models. The literature proposes both a 3-factor model for the PBSS (Martens et al. 2005; Martens, Pedersen, et al., 2007) and a 4-factor model for the PBSS (Walters et al., 2007). Although the literature provides more support for the 3-factor model, the 4-factor model and a baseline model (a model suggesting one total PBS factor) were also tested to make comparisons of fit with the current study’s data. This method of model-fit comparisons allows for stronger conclusions to be drawn related to the best fitting model (Bryant & Yarnold, 1995). Analyses were conducted using LISREL 8.80 (Jöreskog & Sörbom,
2006), a statistical software program designed to estimate and test structural equation models, including CFA models. LISREL was also used to obtain measures of goodness of fit, including the Comparative Fit Index (CFI) and the Root Mean Square Error of Approximation (RMSEA). The CFI should be .95 or greater to indicate good fit, whereas, the RMSEA should be .06 or less to indicate good fit (Hu & Bentler, 1999).

CFAs were conducted using the covariance matrix for analysis. One factor pattern coefficient per factor was set to unity in order to identify the model and set the scale. As scores on the PBSS-R appeared to be skewed, the Satorra-Bentler scaled chi-square was chosen over the traditional chi-square. The Satorra-Bentler chi-square is reported here, but was not used to evaluate fit due to sensitivity to sample size. A multi-group confirmatory factor analysis (MG-CFA) was conducted to further estimate the factorial validity for data produced by the PBSS, particularly in relation to use with previously understudied groups (i.e. African American students).

CFA Hypotheses and Statistical Analyses:

**Hypothesis A**: A CFA will confirm the presence of a three-factor structure (Limiting/Stopping Drinking, Manner of Drinking, and Serious Harm Reduction) for the total sample.

A CFA was conducted with the total sample to assess the fit of the hypothesized model to theoretical model proposed by Martens et al. (2005) and Martens, Pedersen, et al. (2007). Further, the model was also compare with a baseline, 1-factor model and the
4-factor model proposed by Walters, et al. (2007). Fit statistics for the models are presented in Table 7.

Table 7

Fit Statistics: Confirmatory Factor Models of the PBSS-R

<table>
<thead>
<tr>
<th>Model</th>
<th>$\chi^2$</th>
<th>S-B $\chi^2$</th>
<th>df</th>
<th>CFI</th>
<th>RMSEA</th>
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</thead>
<tbody>
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<td>1-Factor</td>
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<td>1032.17</td>
<td>135</td>
<td>0.89</td>
<td>0.013</td>
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<td>3-Factor Total Sample</td>
<td>526.17</td>
<td>421.63</td>
<td>132</td>
<td>0.97</td>
<td>0.072</td>
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<tr>
<td>4-Factor Total Sample</td>
<td>470.40</td>
<td>375.92</td>
<td>129</td>
<td>0.97</td>
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<tr>
<td>4-Factor African American</td>
<td>798.59</td>
<td>638.10</td>
<td>127</td>
<td>0.95</td>
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<td>4-Factor White, non-Hispanic</td>
<td>434.87</td>
<td>361.54</td>
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<td>0.97</td>
<td>0.066</td>
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<tr>
<td>4-Factor Multiple Groups</td>
<td>1241.97</td>
<td>1013.29</td>
<td>257</td>
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<tr>
<td>4-Factor Multiple Groups with loadings constrained</td>
<td>1364.83</td>
<td>1117.58</td>
<td>271</td>
<td>0.95</td>
<td>0.086</td>
</tr>
</tbody>
</table>

S-B $\chi^2$ = Satorra-Bentler scaled chi-square; CFI = comparative fit index; RMSEA = root mean square error of approximation

The 1-factor baseline model demonstrated poor fit with this data, resulting in a CFI of 0.89 and an RMSEA of 0.013. The 3-factor model originally proposed by Martens et al. (2005) demonstrated slightly better fit (CFI=0.97, RMSEA=0.072), but still did not meet acceptable fit standards. The 4-factor model originally proposed by Walters et al. (2007) provided the best fit for this data, yielding a CFI of 0.97 and an RMSEA of 0.067. Due to the fact that the literature provided greater support for the 3-factor model, additional analyses were conducted on both the 3- and 4-factor models (described below) to test for best fit. A CFA of the 3-factor model was run on WNH and AA students to test for invariance. However, LISREL was not able to compute the 3-factor model for AA
students due to such poor fit with that group. This provided further support for the improvement in fit of the 4-factor model. Because of this, Hypothesis A was rejected.

**Hypothesis B:** A multi-group CFA will confirm the presence of a 4-factor structure (Limiting/Stopping Drinking, Manner of Drinking, and Serious Harm Reduction) for both White, non-Hispanic and African American students.

Walters et al. (2007) originally reported 2 items with salient cross-loadings (both on the MOD factor), items 2 and 8 ("Determine not to exceed a set number of drinks," and "Know where your drink has been at all times," respectively). These cross-loadings were freed in the model, but only item 2 demonstrated a significant parameter estimate for the cross-loading, and only for the AA sample. Therefore, the model was run with the WNH sample with no cross loadings, and with item 2 cross-loading in the AA sample. Results for the WNH sample included a CFI of 0.97 and an RMSEA of 0.066, while results for the AA sample included a CFI of 0.95 and an RMSEA of 0.098. Thus, the model demonstrated good fit with the WNH sample, but poorer fit with the AA sample. A CFA was conducted with both groups, and factor loadings were not constrained to be invariant. This analysis yielded a chi-square value of 1241.97 (df=257). This also resulted in a CFI of 0.96 and an RMSEA of .084. The fit of the model was good, providing evidence for the same number of factors across the two groups. Thus, this hypothesis was supported.

**Hypothesis C:** A multi-group CFA will demonstrate invariance of the PBSS factor loadings across White, non-Hispanic and African American samples.
A multiple-group CFA was run, and factor loadings were constrained to be equivalent across groups, although item 2 was still allowed to cross-load in the AA sample. This analysis yielded a chi-square value of 1364.83 (df=271), a CFI of 0.95, and an RMSEA of 0.086, a slightly poorer fit than the previous model where factor loading were not constrained. Invariance can be demonstrated by comparing chi-square values between models to see if the change in chi-square is statistically significant. A non-significant change in chi-square is indicative of model invariance. The comparison of this model to the previous model yielded a change in chi-square of 122.86 (Δdf=14). This value was found to be significant at the 0.05 level, suggesting that the decrease in fit with the constrained factor loadings was statistically significant, and thus the loadings of the 4-factor model are not invariant across racial groups. In other words, the 4-factor structure is not equivalent across groups, and the differences in scores cannot be compared across the two racial groups. As the multiple-group models were not found to be invariant across groups, no further invariance analyses were conducted.
CHAPTER IV

DISCUSSION

College student alcohol use has long been a cause of concern based on high rates of alcohol use and the potential for negative alcohol related consequences, ranging from relatively benign to severe. College students have consistently reported high rates of alcohol use, between 63 and 68 percent reporting use in the past month and between 41 to 46 percent report having binged in the past month (Johnston et al., 2008; Knight et al., 2002; O'Malley & Johnston, 2002; Presley et al., 1998; SAMHSA, 2008; Wechsler & Nelson, 2008).

In this study, the total sample demonstrated rates of drinking that were similar to national rates, with 37.9% of this sample reporting having binged in the past month. Additionally, this sample reported an average of 9.7 drinks per week, 41.6 drinks per month. As expected based on national data, WNH students reported an average of more drinks per week than AA students, and men reported an average of more drinks per week than women. However, due to the small number of males in this sample (N=84, 18.9%), it is possible that rates on the university campus used to obtain the current sample may actually be closer to the higher national rates, as men have consistently been shown to drink more alcohol and to drink more frequently than women (Johnston et al., 2008; Knight et al., 2002; O'Malley & Johnston, 2002; Presley et al., 1998; Wechsler & Nelson, 2008). Thus, a more representative number of men, may have resulted in higher prevalence and binging rates.
Students also report high rates of negative alcohol-related consequences. Results from the Core survey (Presley et al., 1998) indicated that 14.1% of students reported trouble with the police over the past year due to their alcohol use, and 32.6% of students reported having driven a car while under the influence at least once over the past year. That is almost one-third of the national college student population surveyed. To put it another way, Hingson et al. (2005) reported that as many as 2 million students reported having driven a car after 5 or more drinks, and 3 million reported riding with an intoxicated driver.

With regard to negative alcohol-related consequences in this sample, scores from the YAAPST indicated that students in this sample reported experiencing a wide range of negative consequences. Raw scores on this measure ranged from 0 to 71 (possible ranges for the measure are 0 to 110), with an average raw score of 11.3 for this sample. Scores on the YAAPST indicated that WNH students on average experienced more negative consequences than AA students and that men and women did not differ significantly in negative consequences experienced. When compared with the national statistics mentioned above, students in this sample were somewhat dissimilar in at least one area. A smaller percentage of students (7.9%) reported a lifetime prevalence of legal trouble related to their alcohol use, but this discrepancy may be a result of the much smaller sample size than Presley et al.'s (1998) national study or due to the smaller number of males (who tend to drink more and experience more consequences than women) in this study.
A high rate of relatively benign consequences was expected and found in this sample, with over 70% of the sample endorsing both having a headache or hangover and feeling sick to their stomachs after drinking. These were the top two reported consequences in the current study. The most startling fact related to the third most endorsed consequence in this study. Alarmingly, 45% of students in this sample reported ever having driven a car when they knew they had had too much to drink, and 19.6% of this sample reported having driven under the influence 2 or more times. That is close to one-half of the students in this sample, whereas Presley et al. (1998) reported one-third of students in a national sample. Also of note, half of this sample reported having been (sometimes repeatedly) in a position to encounter legal trouble due to driving under the influence, but only 7.9% of students reported having ever encountered legal trouble (of any kind) due to their alcohol use. This lack of external legal consequences (i.e., being arrested for driving under the influence), is likely based on limited resources, suggesting a need to help students develop an internal motivation to stop driving while under the influence of alcohol, likely through brief motivational interventions, to keep themselves safe. Further providing support for motivational interventions, Presley et al. (1998) noted that fewer than 11% of college students thought they may have a drinking problem despite the frequency of experiencing both benign and severe negative alcohol consequences. Considering that this sample reported higher than national average rates of a severe negative alcohol-related consequence (driving while under the influence), Presley et al.'s (1998) dismal statistic of awareness of alcohol problems suggests that national intervention and further brief intervention on this campus (i.e. focusing on PBS) may be immediately warranted.
Due to these alarming statistics, colleges and universities have tried to implement a variety of strategies to prevent particularly the most severe of these negative alcohol-related consequences, with harm-reduction strategies showing the most promise, as they are not likely to increase student resistance (Sullivan & Wodarski, 2004). One area which is showing particular promise is the area of protective behavioral strategies (PBS), cognitive-behavioral strategies that can be used while drinking alcohol to decrease negative alcohol related consequences and possibly limit consumption, although limiting consumption is not a primary goal of PBS (Martens, Ferrier, et al., 2007). Several initial studies of PBS have demonstrated an inverse relationship between use of PBS and negative alcohol-related consequences (Araas & Adams, 2008; Benton et al., 2004; Howard et al., 2007; Martens et al., 2004). The negative relationship between PBS and consequences was further supported by the results of this study. Scores on the PBSS-R and the YAAPST and scores on the PBSS-R and the DDQ were found to be significantly negatively correlated, thus demonstrating that greater use of PBS was associated with fewer instances of negative alcohol-related consequences and lower consumption rates in this study. Further, a study by Larimer et al. (2007) found that simply administering a measure of PBS and providing normative feedback to students based on that measure, resulted in students’ increased use of PBS at a one-year follow-up. This suggests that a measure of PBS may function in and of itself as a brief intervention, particularly when coupled with normative feedback. Due to the consistent evidence that PBS use can significantly decrease negative alcohol-related consequences for students, and due to the fact that PBS is a harm-reduction strategy that is not likely to create resistance in students, finding appropriate ways to further study student PBS use, the relationship
between PBS and consequences, and the potential to use PBS as a brief intervention required the development of appropriate measures.

One of the most difficult pieces of studying students' use of PBS has been the lack of reliable and valid PBS measures. Studies of the original measure (Martens et al., 2005) provided support for a 3-factor model, and construct validity was supported by the inverse relationship between PBSS scores and RAPI scores. Walters et al. (2007) proposed a 4-factor model for their male subjects, splitting LSD into Mixing Non-Alcoholic Drinks with Alcohol (MND) and Planned Limits on Drinking (PLD). However, all of these studies were limited, but, of most concern, was the overwhelming lack of students of color in all samples. Further, the 3-factor model of the PBSS demonstrated very low internal consistency reliability on the third subscale (SHR), with internal consistency values ranging from .59 to .67 (Martens et al., 2005; Martens et al., 2008; Martens, Pedersen, et al., 2007; Walters et al., 2007). Because of these limitations, the purpose of the current study was to gain further psychometric data for the PBSS, to attempt to improve the reliability of the SHR subscale, and to determine how the PBSS performed across racial groups.

*Protective Behavioral Strategies Scale-Revised (PBSS-R)*

PBSS data were obtained for the total sample (N=444). As mentioned previously, the PBSS (Martens et al., 2005) demonstrated some significant problems with reliability on the SHR subscale. It was believed that the low internal consistency values on this subscale were likely related to the small number of items on the scale (3 items). Thus, 25 additional items were generated and reviewed by 5 national experts in the field of college
student alcohol use and prevention. Their ratings resulted in the addition of 3 items to the
original PBSS, thus resulting in the PBSS-R. Means and standard deviations for total
scores and subscale scores indicated no apparent significant differences between any of
the groups; however, formal comparisons were not made based on non-invariance of the
measurement structure across groups. Internal consistency values for the 4-factor model
(Walters et al., 2007), the model which best fit the data for this sample, were .71 for
Mixing Nonalcoholic Drinks with Alcohol (MND), .83 for Planned Limits on Drinking
(PLD), .75 for Manner of Drinking (MOD), and .83 for Serious Harm Reduction (SHR).
Construct validity was demonstrated by the statistically significant negative relationship
between PBSS-R Total scores and YAAPST scores and PBSS-R scores and DDQ scores.

A confirmatory factor analysis (CFA) run on the total sample indicated that the
data from this sample best fit the 4-factor model, originally proposed by Walters, et al.
(2007). This model proved superior to both a 1-Factor baseline model and the 3-factor
model originally proposed by Martens et al. (2005) for the total sample. As one of the
primary purposes of the current study was to examine how the PBSS-R functioned across
racial groups, a CFA using the 4-factor model was conducted with both the WNH sample
and the AA sample, and results indicated that the factor structure for the model
demonstrated acceptable fit for both groups, but was functioning much better for WNH
students than for AA students. Another CFA was then conducted as before, except that
the factor loadings were constrained to be equivalent across racial groups. This resulted
in a CFI of 0.95 and an RMSEA of 0.086. A significant difference in chi-square values
indicated that the 2 models were not invariant. In other words, items on the PBSS-R are
not functioning in the same way across racial groups. The factor structure is similar, but
scores on the 4 subscales are not indicative of true differences in PBS for WNH and AA populations. Because of this, comparisons between racial groups based on PBSS-R scores are not advised and were not made in this study.

The PBSS-R builds on the reliability and validity of the original PBSS developed by Martens et al. (2005). Specifically, the PBSS-R demonstrated improved internal consistency reliabilities and good construct validity with the YAAPST and the DDQ in this study. In both groups, a 4-factor structure appears to best fit the data presented here, suggesting that Limiting/Stopping Drinking (LSD) was, in the initial PBSS, actually measuring two different latent constructs, Mixing Nonalcoholic Drinks with Alcohol (MND) and Planned Limits on Drinking (PLD) (Walters et al., 2007). The original PBSS (Martens et al., 2005) reported that LSD included items related to stopping or slowing alcohol consumption, while Manner of Drinking (MOD) included items related to different ways individuals can consume alcohol (mixing different types of alcohol), and Serious Harm Reduction (SHR) included items related to directly avoiding potentially extremely dangerous consequences. It appears that students in this sample are viewing stopping alcohol consumption and slowing alcohol consumption as two different constructs here. This may, again, be related to the fact that students can demonstrate some levels of resistance when confronted with the possibility of stopping their alcohol consumption, but not necessarily when they are allowed to choose to slow their own alcohol consumption (Sullivan & Wodarski, 2004). Students in this sample may consider setting predetermined limits to their drinking as fundamentally different from simply monitoring and adjusting their drinking by mixing nonalcoholic drinks and alcohol. They may view setting predetermined limits on drinking as an abstinence approach, and
abstinence approaches, as mentioned previously, often do not include motivational components to account for students’ not wanting to change their drinking behaviors (i.e. not wanting to stop drinking or to set predetermined limits to their drinking) or cognitive or behavioral skills to make their own decisions about their alcohol use (Fromme & Corbin, 2004; Fromme & Orrick, 2004; Gintner & Choate, 2007; Larimer & Cronce, 2002; Marlatt & Witkiewitz, 2002). This difference may also relate to different types of students. Students who tend to drink more heavily and frequently or students for whom drinking is perceived as an integral part of their social interactions, may be more likely to choose to mix nonalcoholic and alcoholic drinks rather than set predetermined limits which may affect social standing or established peer group relationships in some way.

While a CFA of the data for this sample indicated that the 4-Factor model did demonstrate good fit for WNH students, it demonstrated only marginally adequate fit for AA students. As such, it is recommended that the PBSS-R be used with AA populations only with caution until further reliability and validity information for this group can be obtained. An EFA of this measure with only AA students may provide further information related to the factor structure of the PBSS-R. An EFA may provide evidence of an alternative factor structure for this group. While the 4-factor model fit better for AA students than both the baseline 1-factor model and the 3-factor model proposed by Martens et al. (2005), it is possible that an alternative factor model (2-factor or 5- or more factors) may fit this model better, although there is no support in the literature for any additional factor models. However, changing the factor structure of the measure may result in an even greater inability to make comparisons between racial groups. An EFA of the PBSS-R may also provide further support for the 4-factor model, but may also
provide information related to partial invariance or to item functioning across groups. If a 4-factor structure is still found to demonstrate the best fit, it is likely that further item analysis of the existing measure may provide greater insight into the functions of different items with AA students and also yield a greater ability to use the measure (as similarly as possible) across different racial groups. As the measure currently exists, one cannot compare scores between WNH and AA students as the CFA provides evidence that differences between scores on the PBSS-R are not indicative of true differences in PBS between WNH and AA students.

In short, the PBSS-R appears to represent an improvement over the original measure (Martens et al., 2005), based on reliability and validity data. The measure demonstrated good reliability for 4 subscales, MND, PLD, MOD, and SHR, as originally proposed by Walters et al. (2007), and provided initial evidence of good construct validity. Interestingly, Walters and colleagues found the 4-factor structure to apply only for men in their study. While no formal comparisons of model fit between men and women were made in the current study, based on the fact that this structure demonstrated the best fit for data in this study, which included a sample that was over 80% female, it appears that this structure did function for women in this sample. It appears that this measure can be used with both WNH and AA populations; however, no comparisons between the two groups based on PBSS-R scores should be made at this stage in measure development.
Limitations of the Current Study

Several limitations to this study exist based on sample characteristics. The sample for this study included undergraduate students from only one university in only one region of the country. The sample was overwhelmingly female. While the sample was majority WNH, this study does represent the most representative sampling of AA students seen to date with the PBSS or PBSS-R. This indicates that the current results may demonstrate the most representative PBS data with AA students to date. Due to the extreme inequivalence of group samples (e.g. 193 WNH females vs. 28 AA males, or 360 females vs. 84 males), very few between group comparisons were appropriate. A more equivalent sample would have allowed more comparisons between gender groups, ethnic groups, and particularly groups based on gender and race. Further, the lack of equivalent samples may also lead to skewed results. For example, men tend to drink more than women and tend to use fewer PBS (Benton et al., 2004; O’Malley & Johnston, 2002). Thus, the results presented here may represent lower rates of drinking and higher rates of PBS than would have been obtained in a more representative sample.

Also, all study data was collected through on-line self report measures. While it is always preferable to have as many types of data and methods of data collection as possible, this is not feasible for all studies. Recent research suggests that on-line data collections can reduce measurement error and missing data, allow for use of partial data, and reduce respondent attrition (Farrell & Petersen, 2010), and that self-report measures of alcohol-related variables are generally reliable and valid (Babor et al., 2000; Miller et al., 2002).
Another limitation of this study was the lack of an additional independent sample with which to replicate the fit of the final model with the modifications to the measure that were made. Based on the results from this study, an additional sample of AA students could have been used to perform an EFA on the measure, and an additional sample of WNH and AA students could have been used to further test the results found here with an independent sample. Replication of these results is particularly important in this case as the literature demonstrates some inconsistency about model fit for the original PBSS (Martens et al., 2005).

Implications and Directions for Future Research

In this study, the PBSS-R demonstrated improved reliability to the initial PBSS (Martens et al., 2005), and it demonstrated initial evidence of good construct validity based on its inverse relationship with YAAPST scores and DDQ scores. However, the measure did not demonstrate invariance across racial groups, thus calling the construct validity of the measure across racial groups into question. Comparisons across groups cannot yet be made without considering the results with caution. The measure also previously demonstrated good potential to function as its own brief intervention, as students may learn more PBS (and, if implemented, possibly decrease negative consequences) by simply completing the measure. Because of initial evidence of good reliability and validity of the measure, and because of its potential to function as a brief intervention, further study of the PBSS-R is warranted to build on the results presented here.
This study represents the initial psychometric examination study of the PBSS-R. Further replication studies to estimate reliability, validity, and model fit for this measure would provide greater support for its usefulness with college student populations. The PBSS-R requires further evidence of construct validity, including evidence of convergent and discriminant validity, in order to be a viable research measure. Based on published literature, it appears that some evidence of predictive validity for the original PBSS has been obtained (Martens, Ferrier, et al., 2007; Martens et al., 2008), but it appears that evidence of predictive validity for populations of color has yet to be investigated. Further, predictive validity for the PBSS-R should be investigated. As previously mentioned, the PBSS-R did demonstrate inverse relationships with both consumption and with negative consequences. However, in order to estimate the predictive validity of the PBSS-R, further analyses to determine the ability of the measure to predict scores on consumption and consequence measures are needed, including analyses with subpopulations of interest is needed. For example, regression analyses may be used to determine whether a high score on the PBSS-R predicts a low score on the DDQ or on the YAAPST would provide support for the predictive validity of the measure. Additionally, the current anchors on the response scale are rather broad (e.g., 3. "Occasionally," “4. Sometimes,” etc.) and quite prone to subjective interpretation. While consistent with test construction conventions, this subjective interpretation among respondents raises concern that a large proportion of score variance may be caused by error, rather than by true differences in the level of PBS use. Future research may explore the value of a more specific operationalization of the response scale that quantifies the response scale (e.g., Never
(0% of the time), Rarely (20% of the time), Occasionally (40% of the time), Sometimes (60% of the time), Usually (80% of the time, Always (100% of the time)).

The primary purpose of this study was to examine this measure across racial groups, as differences between AA and WNH student in the areas of prevalence rates, consequences, and motivations suggested likely differences in PBS use. Based on the limitations described above, further study with populations of color is necessary to estimate reliability and validity of the measure and to determine the appropriate use of the PBSS-R with populations of color. First, an EFA with AA students would provide more information related to the factor structure of the measure with that population. Following an EFA with AA students, a CFA with an independent sample of AA students is warranted to check the obtained model. An additional CFA with an independent sample of WNH students is also needed to evaluate the 4-factor model found to best fit the data in this study. Item response analyses for all populations for the PBSS-R, based particularly on the Rasch model, would provide further information related to the measure’s ability to determine true differences in different levels of the latent traits being examined (Crocker & Algina, 2006). In other words, further examination of individual items may determine a) their ability to measure the latent variable of interest, and b) their ability to detect differences in levels of the latent trait. For example, if someone endorses low scores on a particular item, that person should demonstrate a low level of that latent trait. Additionally, based on the non-invariance of the PBSS-R model across racial groups, analyses of item bias are warranted. Specifically, one must determine if scores on the measure are affected by different sources of variance in different populations (Crocker & Algina, 2006). Parameter estimates may be scaled (mean of 0, standard
deviation of 1), and then item characteristic curves for two populations can be compared. Items that are determined to demonstrate bias should be altered or removed from the measure (Crocker & Algina, 2006). Analyses may also reveal a need to generate and evaluate additional items that may be useful across populations.

Further, more equivalent group samples would allow for greater between-group comparisons related to alcohol use and alcohol-related issues, an area which is somewhat sparse in the college student literature. Further, the item response analyses mentioned above, particularly centered on students of color, would allow greater information to determine if and how between-group comparisons could be made. These results also have implications for all groups who may exhibit consumption differences (gender, race, year in school, Greek affiliation, college athlete status, etc.), as comparisons cannot be made without appropriate reliability and validity information for all groups.

Lastly, Larimer et al. (2007) found that simply administering a measure of PBS could increase students' use of PBS and decrease negative alcohol-related consequences, particularly when paired with normative data. This has profound implications for the use of the PBSS-R as a possible brief intervention for college students, and particularly for incoming college freshman. However, before the PBSS-R can be described as an intervention in and of itself, outcome research examining levels of PBS use, consumption, and consequences before and after administration of the measure is essential.

In sum, the PBSS-R appears to be a promising means of assessing all students' use of PBS. The measure appears to provide four reliable factors and demonstrates good
construct validity when correlated with measures of negative consequences and amount drank. However, the measure was not shown to be invariant across racial groups in this study. Thus, no comparisons between groups can be made without caution. Limitations of previous studies and of the current study, particularly related to use with students of color, warrants further psychometric evaluation.
### Protective Behavioral Strategies Scale

**Instructions:** Please indicate the degree to which you engage in the following behaviors when using alcohol or "partying."

<table>
<thead>
<tr>
<th>Behavior</th>
<th>Never</th>
<th>Rarely</th>
<th>Occasionally</th>
<th>Sometimes</th>
<th>Usually</th>
<th>Always</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Use a designated driver</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>2. Determine not to exceed a set number of drinks</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>3. Alternate alcoholic and nonalcoholic drinks</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>4. Have a friend let you know when you have had enough to drink</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>5. Avoid drinking games</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>6. Leave the bar/party at a predetermined time</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>7. Make sure that you go home with a friend</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>8. Know where your drink has been at all times</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>9. Drink shots of liquor</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>10. Stop drinking at a predetermined time</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>11. Drink water while drinking alcohol</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>12. Put extra ice in your drink</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>13. Avoid mixing different types of alcohol</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>14. Drink slowly, rather than gulp or chug</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>15. Avoid trying to &quot;keep up&quot; or &quot;out-drink&quot; others</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
</tbody>
</table>
APPENDIX B

DEMOGRAPHICS FORM AND DESCRIPTIVE MEASURES

Demographics

Please answer each question

What is your age?

How do you identify yourself? Male Female

1. African American
2. Asian American
3. Eastern Indian American
4. International student
5. Latina/Latino
6. Middle Eastern American
7. Multiracial
8. Native American
9. White (non-Hispanic)
10. Other (specify):

Please estimate your weight in pounds

Please estimate your height in feet and inches

Have you drunk alcohol in the past 30 days? YES NO
How many times have you drunk alcohol in the past 30 days? ______
Have you ever received treatment for alcohol problems? ______

Are you a member of a sorority or fraternity? YES NO
Are you a member of a university athletic team? YES NO
Did you attend a junior college before coming to USM? YES NO

Please identify your academic status
Freshman
Sophomore
Junior
Senior

What is your enrollment status?
Full time
Part time
Where do you primarily live while going to school?
Dorm
Apartment – on campus
Apartment – off campus
Greek House
With parents

What is your employment status?
Not employed
¼ time
½ time
¾ time
Full time

Have you ever gotten into trouble with the university due to your drinking alcohol? YES NO
Have you ever gotten into legal trouble due to your drinking alcohol? YES NO
Have you ever been diagnosed with depression? YES NO
Have you ever been diagnosed with an anxiety disorder? YES NO
Do you use illicit drugs (marijuana, cocaine)? YES NO
Do you take prescription medication? YES NO
Do you take medication not prescribed for you? YES NO
Daily Drinking Questionnaire (DDQ)

INSTRUCTIONS

For each day of the week, fill in both the number of drinks consumed and the number of hours you typically drink.

For the past month, please fill in a number for each day of the week indicating the typical number of STANDARD drinks you usually consume on that day, and the typical number of hours you usually drink on that day.

One standard drink equals

- 1 shot or mixed drink
- 5 ozs. wine or 1 cooler
- 10-12 ozs. beer

<table>
<thead>
<tr>
<th>Number of Drinks</th>
<th>Monday</th>
<th>Tuesday</th>
<th>Wednesday</th>
<th>Thursday</th>
<th>Friday</th>
<th>Saturday</th>
<th>Sunday</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Hours</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
YAAPST -- Brief Version

Answer the following questions as they apply to your drinking.

1. Have you driven a car when you knew you had too much to drink to drive safely?
   - Never
   - Yes, but not in past year
   - Yes, 1 time
   - Yes, 2 times
   - Yes, 3 times
   - Yes, 4-6 times
   - Yes, 7-11 times
   - Yes, 12-20 times
   - Yes, 21-39 times
   - Yes, 40 or more times

2. Have you had a headache (hangover) the morning after you had been drinking?
   - Never
   - Yes, but not in past year
   - Yes, 1 time
   - Yes, 2 times
   - Yes, 3 times
   - Yes, 4-6 times
   - Yes, 7-11 times
   - Yes, 12-20 times
   - Yes, 21-39 times
   - Yes, 40 or more times

3. Have you felt very sick to your stomach or thrown up after drinking?
   - Never
   - Yes, but not in past year
   - Yes, 1 time
   - Yes, 2 times
   - Yes, 3 times
   - Yes, 4-6 times
   - Yes, 7-11 times
   - Yes, 12-20 times
   - Yes, 21-39 times
   - Yes, 40 or more times
4. Have you gotten into physical fights when drinking?
   Never
   Yes, but not in past year
   Yes, 1 time
   Yes, 2 times
   Yes, 3 times
   Yes, 4-6 times
   Yes, 7-11 times
   Yes, 12-20 times
   Yes, 21-39 times
   Yes, 40 or more times

5. Have you gotten in trouble at work or school because of drinking?
   Never
   Yes, but not in past year
   Yes, 1 time
   Yes, 2 times
   Yes, 3 times
   Yes, 4-6 times
   Yes, 7-11 times
   Yes, 12-20 times
   Yes, 21-39 times
   Yes, 40 or more times

6. Have you been fired from a job or suspended or expelled from school because of your drinking?
   Never
   Yes, but not in past year
   Yes, 1 time
   Yes, 2 times
   Yes, 3 times
   Yes, 4-6 times
   Yes, 7-11 times
   Yes, 12-20 times
   Yes, 21-39 times
   Yes, 40 or more times

7. Has your drinking created problems between you and your boyfriend/girlfriend (or spouse), or another near relative?
   Never
   Yes, but not in past year
   Yes, 1 time
   Yes, 2 times
   Yes, 3 or more times
8. Have you lost friends (including boyfriends or girlfriends) because of your drinking?
   Never
   Yes, but not in past year
   Yes, 1 time
   Yes, 2 times
   Yes, 3 or more times

9. Have you neglected your obligations, your family, your work, or school work for 2 or more days in a row because of your drinking?
   Never
   Yes, but not in past year
   Yes, 1 time
   Yes, 2 times
   Yes, 3 or more times

10. Has your drinking gotten you into sexual situations which you later regretted?
    Never
    Yes, but not in past year
    Yes, 1 time
    Yes, 2 times
    Yes, 3 or more times

11. Have you been arrested for drunken driving, driving while intoxicated, or driving under the influence of alcohol?
    Never
    Yes, but not in past year
    Yes, 1 time
    Yes, 2 times
    Yes, 3 or more times

12. Have you had the "shakes" after stopping or cutting down on drinking (for example, your hands shake so that your coffee cup rattles in the saucer or you have trouble lighting a cigarette)?
    Never
    Yes, but not in past year
    Yes, 1 time
    Yes, 2 times
    Yes, 3 or more times

13. Have you felt like you needed a drink just after you'd gotten up (that is, before breakfast)?
    Never
    Yes, but not in past year
    Yes, 1 time
    Yes, 2 times
    Yes, 3 or more times
14. Have you found you needed larger amounts of alcohol to feel any effect, or that you could no longer get high or drunk on the amount that used to get you high or drunk?  
   Never  
   Yes, but not in past year  
   Yes, 1 time  
   Yes, 2 times  
   Yes, 3 or more times  

15. Have you felt that you needed alcohol or were dependent on alcohol?  
   Never  
   Yes, but not in past year  
   Yes, 1 time  
   Yes, 2 times  
   Yes, 3 or more times  

16. Have you felt guilty about your drinking?  
   Never  
   Yes, but not in past year  
   Yes, 1 time  
   Yes, 2 times  
   Yes, 3 or more times  

17. Has a doctor told you that your drinking was harming your health?  
   Never  
   Yes, but not in past year  
   Yes, 1 time  
   Yes, 2 times  
   Yes, 3 or more times  

18. Have you gone to anyone for help to control your drinking?  
   Never  
   Yes, but not in past year  
   Yes, 1 time  
   Yes, 2 times  
   Yes, 3 or more times  

19. Have you attended a meeting of Alcoholics Anonymous because of concern about your drinking?  
   Never  
   Yes, but not in past year  
   Yes, 1 time  
   Yes, 2 times  
   Yes, 3 or more times
20. Have you sought professional help for your drinking (for example, spoken to a physician, psychologist, psychiatrist, alcoholism counselor, clergyman about your drinking)?
Never
Yes, but not in past year
Yes, 1 time
Yes, 2 times
Yes, 3 or more times
EXPERT QUESTIONNAIRE

We are conducting some research on the Protective Behavioral Strategies Scale (Martens, et al., 2005) and would like to add some additional items to the Serious Harm Reduction subscale of the PBSS to improve its reliability. Serious Harm Reduction based on Martens (2005) includes items related to directly trying to avoid potentially very dangerous consequences associated with drinking alcohol. The purpose of this survey is to develop an additional item pool for the third subscale, Serious Harm Reduction. The PBSS currently includes 3 items on this scale: 1) use a designated driver, 2) make sure that you go home with a friend, and 3) know where your drink has been at all times.

Using the scale below at right, please indicate the degree to which you feel that each of the following items relates to the Serious Harm Reduction subscale.

<table>
<thead>
<tr>
<th>Item</th>
<th>Not Relevant</th>
<th>Mildly Relevant</th>
<th>Moderately Relevant</th>
<th>Very Relevant</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Refuse a drink from a stranger</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>2. Drink only with trusted friends</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>3. Avoid getting in a car with someone who has been drinking</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>4. Avoid mixing alcohol with other drugs (i.e., marijuana, ecstasy)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>5. Avoid mixing alcohol with prescription drugs (whether prescribed for you or not)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>6. Know how you are getting home from the party</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>7. Going out partying in co-ed groups</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>8. Going out partying in groups</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>9. Depend on the group to keep you out of unsafe situations</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>10. Always know what you are drinking</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>11. Avoid going off in isolation with someone you just met</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>12. Walk home with people you trust</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>13. Avoid leaving the party/bar alone</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>14. Use public transportation to get home</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>15. Pay attention to bodily cues of intoxication (e.g., feeling sick)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>16. Asking for help if feeling too intoxicated or sick</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>17. Inform a trusted friend when you had too much to drink and need to leave the party</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>18. Only drink in safe environments</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>19. Make/get your own drinks</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>20. Avoid drinking when engaging in mentally and physically demanding recreational activities (i.e., swimming, skiing, boating, etc.)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>21. Eat before/while drinking</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

Comments or Suggestions for additional items:

Thank you for your completion of this survey. Should you have any additional questions or comments please feel free to contact Michael B. Madson, Ph.D. at (601) 266-4546 or Michael.Madson@usm.edu.
APPENDIX D

CONSENT FORM

The University of Southern Mississippi

Authorization to Participate in Research Project

Consent is hereby given to participate in the study titled: *Examination of alcohol use, consequences, and protective strategies.*

1. **Purpose:**
   I understand that the purpose of this survey study is to gain further information about alcohol use, related consequences and use of protective strategies when actively consuming alcohol.

2. **Description of Study:**
   I understand that in this study I will be asked to complete a demographic form and a 143-item questionnaire on-line. I understand that these data will be aggregated and exported into a computer database program and appropriately analyzed. I understand that this on-line survey does not incorporate any invasive procedures.

3. **Benefits:**
   I understand that I may benefit from completing this survey by becoming aware of strategies I may use while consuming alcohol in order to reduce negative consequences that may occur as a result of drinking.

4. **Risks:**
   I understand that this is a minimal risk survey study that does not ask significantly personal questions and as a result there do not appear to be any major risks related to my completion of the survey. I understand that I can discontinue from further participation in the study at any time without any consequence. Further, I understand that I will be able to contact the principle investigator, Michael B. Madson, Ph.D., at any time throughout the study. Finally, I understand that if I need to I should visit my campus counseling services or other counseling services although this need is not anticipated.

   USM Student Counseling Services  Community Counseling and Assessment Center
   Kennard-Washington Hall, Room 200  Owings-McQuagge Hall
   601-266-4829  601-266-4601

5. **Confidentiality:**
   I understand that all survey and demographic information will be completed anonymously on-line. I understand that this on-line survey has security measures
to protect my responses. Further, I understand that each survey will be given an identification number upon receipt and that the survey will be separated from the informed consent. I understand that as this is an on-line survey there will be no hard copies of information. I understand that demographic and survey information will be exported into statistical software, will be aggregated, and will be stored on a password protected computer.

6. **Alternative procedures:**
I understand that I may discontinue participation in this study at any time without consequence.

7. **Subject's assurance:**
I understand that whereas no assurance can be made concerning results that may be obtained (since results from investigational studies cannot be predicted) the researcher will take every precaution consistent with the best scientific practice. Participation in this project is completely voluntary, and subjects may withdraw from this study at any time without penalty, prejudice, or loss of benefits. Questions concerning the research should be directed to Michael B. Madson, Ph.D., at (601) 266-4546 or Michael.madson@usm.edu. This project and this consent form have been reviewed by the Institutional Review Board, which ensures that research projects involving human subjects follow federal regulations. Any questions or concerns about rights as a research subject should be directed to the Chair of the Institutional Review Board, The University of Southern Mississippi, 118 College Drive #5147, Hattiesburg, MS 39406-0001, (601) 266-6820. A copy of this form will be given to the participant.

8. **Signatures:**
In conformance with the federal guidelines, the signature of the subject must appear on all written consent documents. The University also requires that the date and the signature of the subject appear on the consent form. I understand that in providing my University ID number, I am electronically signing this consent form, and that by completing this survey, I am consenting to participate.
Protective Behavioral Strategies Scale - Revised

**Instructions:** Please indicate the degree to which you engage in the following behaviors when using alcohol or "partying."

<table>
<thead>
<tr>
<th>Behavior</th>
<th>Never</th>
<th>Rarely</th>
<th>Occasionally</th>
<th>Sometimes</th>
<th>Usually</th>
<th>Always</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Use a designated driver</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>2. Determine not to exceed a set number of drinks</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>3. Alternate alcoholic and nonalcoholic drinks</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>4. Have a friend let you know when you have had enough to drink</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>5. Avoid drinking games</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>6. Leave the bar/party at a predetermined time</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>7. Make sure that you go home with a friend</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>8. Know where your drink has been at all times</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>9. Drink shots of liquor</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>10. Stop drinking at a predetermined time</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>11. Drink water while drinking alcohol</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>12. Put extra ice in your drink</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>13. Avoid mixing different types of alcohol</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>14. Drink slowly, rather than gulp or chug</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>15. Avoid trying to &quot;keep up&quot; or &quot;out-drink&quot; others</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>16. Avoid getting in a car with someone who has been drinking</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>17. Always know what you are drinking</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>18. Avoid mixing alcohol with prescription drugs</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
</tbody>
</table>
APPENDIX F

INSTITUTIONAL REVIEW BOARD APPROVAL

THE UNIVERSITY OF SOUTHERN MISSISSIPPI

Institutional Review Board

118 College Drive #5147
Hattiesburg, MS 39406-0001
Tel: 601.266.6820
Fax: 601.266.5509
www.usm.edu/irb

HUMAN SUBJECTS PROTECTION REVIEW COMMITTEE
NOTICE OF COMMITTEE ACTION

The project has been reviewed by The University of Southern Mississippi Human Subjects Protection Review Committee in accordance with Federal Drug Administration regulations (21 CFR 26, 111), Department of Health and Human Services (45 CFR Part 46), and university guidelines to ensure adherence to the following criteria:

- The risks to subjects are minimized.
- The risks to subjects are reasonable in relation to the anticipated benefits.
- The selection of subjects is equitable.
- Informed consent is adequate and appropriately documented.
- Where appropriate, the research plan makes adequate provisions for monitoring the data collected to ensure the safety of the subjects.
- Where appropriate, there are adequate provisions to protect the privacy of subjects and to maintain the confidentiality of all data.
- Appropriate additional safeguards have been included to protect vulnerable subjects.
- Any unanticipated, serious, or continuing problems encountered regarding risks to subjects must be reported immediately, but not later than 10 days following the event. This should be reported to the IRB Office via the "Adverse Effect Report Form".
- If approved, the maximum period of approval is limited to twelve months. Projects that exceed this period must submit an application for renewal or continuation.

PROTOCOL NUMBER: 29081302
PROJECT TITLE: Confirmatory Factor Analysis of the Protective Behavioral Strategies Scale (PBSS) Across Racial Groups
PROPOSED PROJECT DATES: 08/15/09 to 08/15/10
PROJECT TYPE: Dissertation or Thesis
PRINCIPAL INVESTIGATORS: Sasha Lambert
COLLEGE/DIVISION: College of Education & Psychology
DEPARTMENT: Psychology
FUNDING AGENCY: N/A
HSPRC COMMITTEE ACTION: Expedited Review Approval
PERIOD OF APPROVAL: 08/17/09 to 08/16/10

Lawrence A. Hosman, Ph.D.
HSPRC Chair

[Signature]
8-4-09

Date
REFERENCES


