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Protective Behavioral Strategy Subtypes as Moderators of the Relationship Between Alcohol Consumption and Alcohol-Related Problems

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**Protective Behavioral Strategy Subtypes As Moderators of the
Relationship between Alcohol Consumption and Alcohol-Related
Problems**

by

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B.S., 2011, Old Dominion University

A Thesis Submitted to the Faculty of
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ABSTRACT

Protective Behavioral Strategy Subtypes As Moderators of the Relationship between Alcohol Consumption and Alcohol-Related Problems

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Protective behavioral strategy (or drinking control strategy) use is widely regarded as an effective tool for reducing negative consequences from consuming alcohol (Martens et al., 2005; Martens et al., 2008). Research has shown that frequent protective behavioral strategy use buffers the relationship between alcohol consumption and alcohol-related problems (Borden et al., 2011), and that gender moderates this effect (Benton et al., 2004); however. The present research was used to expand on previous research showing that protective behavioral strategy use can buffer the relationship between alcohol consumption and alcohol-related problems. Further, the assessment of protective behavioral strategy use across gender was also evaluated. Three hundred and thirteen undergraduate college students were sampled to participate in this study. Confirmatory factor analysis showed that gender differences exist in the measurement of protective behavioral strategy use with a popular measure of the construct. Regression analysis showed that a certain type of protective behavioral strategies moderates the relationship between alcohol consumption and alcohol-related problems. Further, there was no effect of gender on the moderating effect. The results of the present study improve the understanding of the relationship between protective behavioral strategy use and alcohol-related problems and can ultimately improve information for prevention efforts.

This thesis is dedicated to my fiancée, Jessica Bodkins. Thank you for your support during my academic pursuits.

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The mentorship that Dr. Henson and Dr. Pearson have provided has allowed me to reach my potential as a researcher.

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CHAPTER I

INTRODUCTION

A common occurrence on college campuses, research shows that approximately 80% of college students report consuming alcohol (Johnston, O'Malley, Bachman, & Schulenberg, 2010). Moreover, researchers have estimated that 43% of college students engage in binge drinking (i.e., consuming five or more drinks during a single drinking occasion) at least once a month (Hingson, Heeren, Winter, & Wechsler, 2005), and 44.1% of college students report having at least one symptom of alcohol abuse or dependence (Knight et al., 2002). A consequence of this extreme alcohol consumption, many college students also frequently report experiencing negative alcohol-related consequences (e.g., passing out, missing class, problems with interpersonal relationships). Researchers have estimated that 71% of college students have experienced at least one alcohol-related problem within the past 30 days (Neal, Corbin, & Fromme, 2006). Further, researchers have also estimated that 600,000 college students are hurt or injured, and 1,800 college students die annually from alcohol-related incidents (e.g., traffic accidents, falling, alcohol poisoning; Hingson, Zha, & Weitzman, 2009).

Over the past decade, research on cognitive behavioral strategies that can be used to reduce alcohol-related problems, called *protective behavioral strategies*, has increased dramatically. Many researchers have shown that more frequent use of protective behavioral strategies is related to experiencing fewer alcohol-related problems (Martens, Pederson, LaBrie, Ferrier, Cimini, 2007; Martens et al., 2008; Martens et al., 2009; Pearson, Kite, & Henson, 2012), and researchers recommend implementing protective behavioral strategies training in alcohol treatment/prevention programs (Martens et al.,

2005; Martens et al., 2008). Researchers have also shown that frequent PBS use buffers (i.e., attenuates) the positive relationship between alcohol consumption and alcohol-related problems (Benton et al., 2004; Borden et al., 2011). These findings provide insight into how PBS use can reduce alcohol-related problems; however, these aforementioned studies have limitations that can be addressed with additional research. Despite the fact that researchers have identified conceptually, and statistically, distinct types of protective behavioral strategies (Martens et al., 2005; Novik & Boekeloo, 2011; Sugarman & Carey, 2007), researchers have not yet examined how the different facets of protective behavioral strategies moderate the relationship between alcohol consumption and alcohol-related problems.

The present research was used to more thoroughly examine PBS use as a moderator of the relationship between alcohol consumption and alcohol-related problems. Relationships found in the current literature were further explored and the design of previous research was improved upon. Specifically, three different types of protective behavioral strategies, as assessed by a popular measure of the construct (discussed in detail in a subsequent section of this paper), were evaluated as moderators of the relationship between alcohol consumption and alcohol-related problems. Gender differences for moderating effects were also assessed. In order to ensure that valid conclusions could be made from gender comparisons, measurement invariance of the PBS use measure used in the present research was tested. The findings from the present research could improve the current understanding of how certain types of protective behavioral strategies can protect college students from experiencing alcohol-related problems, thus ultimately improving alcohol safety information for college students.

ALCOHOL CONSUMPTION AND ALCOHOL-RELATED PROBLEMS

Numerous researchers have demonstrated that there is a positive relationship between alcohol consumption and alcohol-related problems (Curcio & George, 2011; Gonzalez, Reynolds, & Skewes, 2011; Martens et al., 2008; Moeller & Crocker, 2009; Pearson et al., 2012), such that the more college students drink, the more likely they are to experience alcohol-related problems. For example, research has shown that self-reported alcohol-related problems are positively correlated with the number of drinks consumed per month (Gonzalez et al., 2011), the number of drinks consumed on a typical week of drinking (Pearson et al., 2012), the number of days when alcohol is consumed during a typical week (Pearson et al., 2012), and the number of heavy episodic drinking days per month (Gonzalez et al., 2011; Moeller & Crocker, 2009). In summary, across various measures of alcohol consumption, increased alcohol use is positively related to alcohol-related problems. Despite the well-known positive relationship between alcohol consumption and alcohol-related problems, college student drinking is still a problem (Wechsler et al., 2002). Martens et al. (2005) suggest that responsible drinking training should be the focus of prevention efforts for college students.

PROTECTIVE BEHAVIORAL STRATEGIES

Protective behavioral strategies can be defined as “behaviors that individuals can engage in while drinking alcohol in order to limit negative alcohol-related consequences” (Martens et al., 2004, p. 390). Protective behavioral strategies include alternating alcoholic and non-alcoholic beverages, avoiding drinking games, and using a designated driver (Martens et al., 2005). These strategies are designed to effect change in *how* alcohol is consumed not just *how much* in order to reduce the likelihood of negative

consequences. Generally, research has shown that PBS use is negatively related to alcohol-related problems (Benton et al., 2004; Delva et al., 2004; Martens et al., 2004; Martens et al., 2008; Martens, Pederson et al., 2007; Patrick, Lee, & Larimer, 2011; Pearson et al., 2012), and some evidence suggests that PBS use is negatively related to alcohol consumption (Martens, Pederson et al., 2007; Pearson et al., 2012).

Protective Behavioral Strategies and Alcohol Consumption. Protective behavioral strategies are often used to reduce alcohol-related problems, and one mechanism to reduce problems is to promote reduced alcohol consumption. Currently, there are mixed findings in PBS literature about how PBS use relates to alcohol consumption. Some evidence suggests that PBS use is negatively associated with binge drinking episodes (Martens, Pederson, et al., 2007) and number of drinks consumed per week (Martens, Pederson et al., 2007; Martens et al., 2008; Pearson et al., 2012), whereas other researchers have found positive relationships between certain protective strategies and alcohol consumption (Sugarman & Carey, 2007; 2009). Specifically, Sugarman and Carey found that PBS use while drinking is positively related to alcohol consumption, which suggests that individuals who use protective behavioral strategies while drinking actually consume more alcohol than those who do not. Although some researchers suggest that these theoretically inconsistent relationships may be due to measurement bias (Kite, Pearson, & Henson, 2013), the relationships between PBS use and alcohol consumption in the literature are mixed.

Protective Behavioral Strategies and Alcohol-Related Problems. In contrast to PBS research related to alcohol consumption, research regarding the relationship between PBS use and alcohol-related problems has consistently shown negative relationships

between PBS use and alcohol-related problems (Araas & Adams, 2008; Martens, Pederson et al., 2007; Martens et al., 2008; Martens et al., 2009; Patrick et al., 2011; Pearson et al., 2012). Further, research has shown that PBS use is negatively related to alcohol-related problems when controlling for gender (Martens et al., 2004) and alcohol consumption (Delva et al., 2004; Martens et al., 2004; Patrick et al., 2011). In other words, the relationship between PBS use and alcohol-related problems is above and beyond what can be explained by alcohol consumption or gender. Further, recent research has examined PBS use over time and demonstrated that increases in certain PBS are associated with less alcohol consumption and fewer alcohol-related problems (Martens, Martin, Littlefield, Murphy, & Cimini, 2011).

PBS Use as a Moderator. As previously mentioned, research has already demonstrated that PBS use moderates the relationship between alcohol consumption and alcohol-related problems (Benton et al., 2004; Borden et al., 2011). With a large sample of college students, Benton et al. examined PBS use as a single variable and assessed alcohol consumption as typical number of drinks per drinking occasion. Benton and colleagues found a buffering interaction between PBS use and alcohol consumption; frequent PBS use attenuated the relationship between alcohol consumption and alcohol-related problems. More recently, Borden et al. examined the interaction between consumption variables and PBS use when predicting alcohol-related problems; they found an interaction between PBS use and binge drinking episodes when predicting alcohol-related problems. The interaction showed that, when controlling for gender, more frequent PBS use attenuated the relationship between binge drinking and alcohol-related problems.

Research demonstrating that protective behavioral strategies serve as a moderator between alcohol consumption and alcohol-related problems is promising. In the college student population, many individuals may not be interested in reducing or eliminating their alcohol consumption (Johnston, O'Malley, Bachman, & Schulenberg, 2012); therefore, behaviors that can help college students decrease the likelihood of experiencing negative consequences from drinking are important. With the current state of the literature, we know that protective behavioral strategies can be used in prevention efforts when the goal is to decrease alcohol-related problems by reducing the harm of high levels of alcohol consumption.

One problem is that when assessed as a single construct, protective behavioral strategies represent a wide range of behaviors. Separating protective behavioral strategies into distinct subtypes and examining each individually as a moderator of the relationship between alcohol consumption and alcohol-related problems would provide more informative results. Findings from such research would provide more insight into exactly how certain types of protective behavioral strategies can be protective, which would allow prevention programs to recommend specific behaviors for individuals that wish to reduce the harmful effects of heavy alcohol consumption.

PBS Subtypes. For the present research, protective behavioral strategies were operationalized as behaviors used when in a potential drinking situation (opposed to behaviors that are used every day to avoid drinking situations; see Sugarman & Carey, 2007) as assessed by the Protective Behavioral Strategies Survey (PBSS; Martens et al., 2005). Martens et al. (2005) identified three factors with the PBSS, *Stopping/Limiting Drinking*, *Manner of Drinking*, and *Serious Harm Reduction*. The Stopping/Limiting

Drinking factor refers to strategies used to control how much alcohol one consumes (e.g., putting extra ice in your drink), and pace of drinking (e.g., alternating alcoholic and nonalcoholic drinks). The Manner of Drinking factor refers to strategies used to determine the manner in which one consumes alcohol (e.g., avoiding drinking games, or drinking slowly rather than gulping or chugging). The Serious Harm Reduction factor refers to strategies used to avoid potentially harmful outcomes (e.g., using a designated driver, or knowing where your drink has been at all times). These factors are only weakly to moderately correlated (Martens et al., 2005); therefore, they assess related, but distinct types of protective behaviors. Numerous studies have used a multi-factor approach when measuring PBS use when predicting alcohol outcomes (Martens, Pederson et al., 2007; Martens et al., 2008; Pearson et al., 2012); therefore, in the present research each PBS subtype will be examined individually in hypothesis testing.

Examining Individual Types of PBS. Recent research has demonstrated the different types of PBS, as assessed by the PBSS, have different predictive relationships with alcohol outcome variables (Martens et al., 2011). Specifically, longitudinal research has shown that changes in the use the Stopping/Limiting Drinking PBS use were associated with changes in drinks per week, whereas Manner of Drinking and Serious Harm Reduction PBS use changes were not associated with changes in alcohol consumption (Martens et al., 2011). Further, Martens et al. (2011) also found that the use of Serious Harm Reduction PBS was the only predictor of changes in alcohol-related problems. To the best of my knowledge, no one has evaluated individual types of protective behavioral strategies as moderators of the relationship between alcohol consumption and alcohol-related problems.

Given the heterogeneity of behaviors described as protective behavioral strategies, research showing that only certain types of protective behavioral strategies moderate the relationship between alcohol consumption and alcohol-related problems would provide information to clinicians that is more useful than what is currently stated in the literature. Protective behavioral strategies that show the aforementioned moderation effect would be particularly useful for prevention information aimed towards college students that are likely to consume high amounts of alcohol. Strategies used control *how much* alcohol is consumed (i.e., Stopping/Limiting Drinking strategies; Martens et al., 2005) are negatively related to alcohol-related problems; however, frequent use of these strategies is not likely to reduce the positive relationship between alcohol consumption and alcohol-related problems. Conversely, strategies used to manage *how* alcohol is consumed (i.e., Manner of Drinking and Serious Harm Reduction strategies; Martens et al.) are likely to moderate the relationship between consumption and problems. In other words, using Manner of Drinking and Serious Harm Reduction should reduce the harmful effects of high alcohol consumption.

GENDER DIFFERENCES

Alcohol Consumption. When alcohol consumption is assessed as the number of drinks consumed over a given period of time, research consistently shows that males consume more alcoholic beverages than females (Benton et al., 2004; Lewis & Neighbors, 2004). Research also suggests that males engage in binge drinking episodes more often than females (Borden et al., 2011). A possible explanation for females consuming less alcohol, research shows that females do not require as much alcohol in

order to achieve the same level of intoxication as males (Graham, Wilsnack, Dawson, & Vogeltanz, 1998).

Alcohol-Related Problems. There are conflicting findings in the literature about gender differences in alcohol-related problems. Some researchers have found that males experience more alcohol-related problems (Park & Grant, 2005), whereas others have found no statistically significant relationship between gender and alcohol-related problems (Pearson et al., 2012). This discrepancy could be due to differences methods of assessment of alcohol-related problems. The present research used the method of alcohol-related problem assessed used by Pearson et al. (counting the number of problems that participants report experiencing over a given period of time), therefore no gender differences in alcohol-related problems were expected in the present research.

PBS Use. Gender differences have also been found in the self-reported use of protective behavioral strategies. Researchers have found that females report using protective behavioral strategies more often than males (Benton et al., 2004; D’Lima, Pearson, & Kelley, 2012); this could be because females also report higher approval of the use of protective behavioral strategies (Demartini, Carey, Lao, & Luciano, 2011). Specifically, research has shown that females are more likely to use Stopping/Limiting, Manner of Drinking and Serious Harm Reduction PBS (Lewis, Rees, & Lee, 2009). More relevant to the present research, gender has been shown to be a moderator of the interaction between PBS use and alcohol consumption when predicting alcohol-related problems (Benton et al., 2004). Specifically, Benton and colleagues found that PBS use is a stronger moderator for males than females; however, they did not offer theoretical justification of their finding. In summary, gender differences exist in self-reported PBS

use. With the vast gender differences described in the college student drinking literature and the gender moderation effect described by Benton and colleagues, it is important to see if interactions between PBS types and alcohol consumption hold for both males and females. If protective behavioral strategies are stronger moderators for males than they are for females, then perhaps PBS use information should be the focus of prevention efforts for males that often consume large amounts of alcohol, but not necessarily females.

LIMITATIONS IN THE CURRENT LITERATURE

Measurement Invariance of PBS Use Across Gender. Many researchers have explored gender differences when examining PBS use (Benton et al., 2004; Borden et al., 2011; LaBrie et al., 2011; Pearson et al., 2012); these researchers made the assumption that their measures of PBS use were assessing the same latent behavior for both males and females. If the same behavior was not being assessed, then gender differences found may not actually be meaningful. To the best of my knowledge, no one has examined any PBS use measure using Confirmatory Factor Analysis (CFA) to look for measurement differences by gender. In order to make gender comparisons in the present research, measurement invariance (MI) of the aforementioned PBSS across gender needs to be established to ensure that results from analyses exploring gender differences in PBS use are interpretable.

PBS Use as a Moderator of Alcohol Consumption. To the best of my knowledge, Benton et al. (2004) and Borden et al. (2011) are the only published studies that have shown a buffering interaction between PBS use and alcohol consumption when predicting alcohol-related problems. These studies provided strong contributions to the

literature; however, there are limitations with both studies. Benton et al. and Borden et al. assessed PBS use and alcohol related-problems with measures that have not been used elsewhere in the PBS literature. In both studies, the researchers acknowledged their measurement of PBS use and alcohol-related problems as a limitation of their research. Another limitation is that both studies examined protective behavioral strategy use as a single construct, rather than examining different types of protective behavioral strategies separately. Numerous studies have shown that protective behavioral strategies are best assessed and operationalized as having multiple factors (Martens et al., 2005; Martens, Pederson et al., 2007), even with other measures of the construct (Novik & Boekeloo, 2011; Pearson et al., 2012; Sugarman & Carey, 2007; 2009). Therefore, assessing the relationships found by Benton et al. and Borden et al. with multiple types of PBS tested individually could yield more insightful results that can be applied to alcohol prevention efforts aimed towards promoting PBS use to reduce alcohol-related problems.

Gender Differences in PBS Effectiveness. Research has shown that PBS use is a stronger moderator of the relationship between alcohol consumption and alcohol-related problems for males than for females (Benton et al., 2004). This suggests that PBS use is particularly effective at buffering the relationship between alcohol consumption and alcohol-related problems for males. To the best of my knowledge, this research finding has not yet been replicated. Further, one weakness in the design of Benton and colleagues was the lack of evidence of measurement invariance for their measure of PBS use. Because of the implications for prevention information, this finding should be further explored with invariant measures of PBS use.

PRESENT RESEARCH

Improving on Past Research. The present research expands on the findings of Benton et al. (2004) and Borden et al. (2011) in three important ways. First, PBS use and alcohol-related problems were assessed with measures that are commonly used in the PBS literature. Second, MI of each PBSS subtype across gender was tested to show if gender comparisons are appropriate. Third, the present research examined three subtypes of PBS (rather than PBS as a single factor) individually and individual interactions with alcohol consumption when predicting alcohol-related problems. These contributions to the current literature are based on three aims.

Aim 1. With the vast gender differences shown in the PBS literature, I wanted to determine if gender comparisons on PBS use are appropriate when assessing behavior with the PBSS. The first aim of the present research was to demonstrate MI of PBSS across gender. Demonstrating MI of the PBSS would show that the scale is assessing the same latent construct for males and females. If researchers wish to make gender comparisons on PBS use when assessing the construct with the PBSS, the factor structure of the PBSS must be shown to be the same for males and females. This aim was addressed with two hypotheses.

Hypothesis 1a. Hypothesis 1a was that the covariance matrices for the PBSS are equal for males and females. Hypothesis 1a was tested by comparing model fit between a model in which the covariance matrices were estimated freely and a model in which the covariance matrices were set to equality.

Hypothesis 1b. Hypothesis 1b was that the factor loadings for each PBSS subscale are equal for males and females; this is typically referred to as metric invariance

(Vandenburg & Lance, 2000). Hypothesis 1b was tested by comparing CFA models in which the factor loadings for the PBSS items were fixed (metric models) and estimated freely (configural models) across gender.

Aim 2. The second aim for the present research was to demonstrate differences in how different types of protective behavioral strategies moderate the relationship between alcohol consumption and alcohol-related problems. Specifically, I wanted to demonstrate that certain types of protective behavioral strategies (Manner of Drinking & Serious Harm Reduction) moderate the relationship between alcohol consumption and alcohol-related problems, whereas other strategies (Stopping/Limiting Drinking) are not moderators.

Hypothesis 2a. Because Stopping/Limiting Drinking strategies are believed to affect *how much* rather than *how* alcohol is consumed, hypothesis 2a was that Stopping/Limiting Drinking strategy use *does not* moderate the relationship between alcohol consumption and alcohol-related problems. Specifically, I hypothesized that levels of Stopping/Limiting Drinking strategy use are not related to changes in the relationship between alcohol consumption and alcohol-related problems. Stopping/Limiting Drinking strategies should not interact with alcohol consumption when predicting alcohol related problems.

Hypothesis 2b. Because Manner of Drinking strategies affect *how* alcohol is consumed, hypothesis 2b was that Manner of Drinking strategy use *does* moderate the relationship between alcohol consumption and alcohol-related problems. Specifically, I hypothesized that high levels of Manner of Drinking strategy use are associated with a weaker relationship between alcohol consumption and alcohol-related problems.

Hypothesis 2c. Because Serious Harm Reduction strategies affect *how* alcohol is consumed, hypothesis 2c was that Serious Harm Reduction strategy use *does* moderate the relationship between alcohol consumption and alcohol-related problems. Specifically, I hypothesized that high levels of Serious Harm Reduction strategy use will be associated with a weaker relationship between alcohol consumption and alcohol-related problems.

Aim 3. The third aim of the present research was to determine if gender differences exist in the interactions between any PBS subtype and alcohol consumption. Specifically, I wanted to determine if protective behavioral strategies that moderate the relationship between alcohol-consumption and alcohol-related problems are stronger moderators for males. This aim was added to the research study to address the findings of Benton et al. (2004).

Hypothesis 3a. Hypothesis 3a was that the interaction between Stopping/Limiting Drinking strategy use and alcohol consumption is not moderated by gender. In other words, there will not be a significant Gender x Manner of Drinking x Alcohol Consumption interaction when gender is added to the regression model predicting alcohol-related problems. I did not expect to find a significant interaction between alcohol consumption and Stopping/Limiting Drinking strategy use; therefore, I did not expect gender to moderate that interaction.

Hypothesis 3b. Hypothesis 3b was that the interaction between Manner of Drinking strategy use and alcohol consumption is moderated by gender. In other words, there will be a significant Gender x Manner of Drinking x Alcohol Consumption interaction when gender is added to the regression model predicting alcohol-related

problems. I expected that a stronger moderating effect of alcohol consumption would be found for males.

Hypothesis 3c. Hypothesis 3c was that the interaction between Serious Harm Reduction strategy use and alcohol consumption is moderated by gender. In other words, there will be a significant Gender x Serious Harm Reduction x Alcohol Consumption interaction when gender is added to the regression model predicting alcohol-related problems. I expected that a stronger moderating effect of alcohol consumption would be found for males.

CHAPTER II

METHOD

PARTICIPANTS

Power Analysis. A power analysis was conducted prior to data collection to ensure that an appropriate number of participants were recruited to take part in this study. Previously, researchers (Benton et al., 2004) have found very small effect sizes when exploring the interactions of interest in the present research; with an improved design, I hoped to find larger effects. For the present research, any effect size of an interaction less than .02 (which is defined as ‘small’; Cohen, 1988) is not believed to be meaningful. According to a power analysis conducted using G-power 3.1 (Faul, Erdfelder, Lang, & Buchner, 2007), in order to detect a small effect when testing for interactions, 387 participants were required for the analytic sample (two-tailed, $\alpha = .05$, $\beta = .20$). Given the results of the a priori power analysis, I decided that I would attempt to recruit between 300 and 400 participants.

Participant Eligibility. In order to be eligible for participation, participants needed to be at least 18 years of age at the date of participation and have consumed at least one alcoholic beverage within the past 30 days prior to the date of participation; these criteria were stated on the website advertising the study. I was interested in individuals that drink at least once a month, rather than solely those that are heavy drinkers. I wanted to be able to generalize the present research to the entire population of college student drinkers. The eligibility criteria used in the present research are consistent with the criteria used in previous research in the PBS literature (Martens et al., 2005; Pearson et al., 2012).

Analytic Sample. The initial sample of participants consisted of 353 undergraduate college students conveniently sampled from a Psychology Department. The final analytic sample for the present research was comprised of 313 participants. The process used to obtain the analytic sample is discussed in detail in the results section of this paper. Because the design of the present research required focus on gender differences, I attempted to recruit an equal number of males and females by restricting female enrollment. Restriction of female enrollment was necessary because the research participant pool at the participating university was approximately 75% female. I only allowed 30 females to sign-up every two weeks, and I had no restriction for male enrollment. My attempt for equal recruitment was successful; the analytic sample consisted of 53% females. The average age for participants in the analytic sample was 21.50 years ($SD = 4.90$). The majority of the analytic sample reported their race as Caucasian or White (54.6%); the remaining participants in the analytic sample were 29.4% African-American or Black, 6.4% Latino or Latina, 4.2% Asian or Pacific Islander, 0.3% Native American, and 5.1% described their race as "Other." Participants in the analytic sample were college Freshmen (21.8%), Sophomores (22.8%), Juniors (26.0%), and Seniors (29.5%). Lastly, 10.2% of the sample reported belonging to a Greek organization.

PROCEDURE

Participants were recruited through a Psychology department research participation pool and chose to enroll in the present research for course credit. An online questionnaire was used for data collection and required approximately 30 minutes to complete. All participants were presented with an electronic notification statement prior

to participation (see Appendix A); those that chose not to participate after reading the notification statement were allowed to stop their participation without penalty. Those willing to participate completed the assessment battery online in a setting of their choosing. Data were collected during the Fall of 2012. Importantly, all APA ethical guidelines were followed throughout the administration of this study.

MATERIALS

Protective Behavioral Strategies. PBS use was assessed with the Protective Behavioral Strategy Survey (PBSS; Martens et al., 2005; see Appendix B). The PBSS is a 15-item questionnaire that assesses how often certain protective behavioral strategies are used when consuming alcohol or in a party situation. In the present research, the instructions for the PBSS stated, “Indicate the degree to which you engaged in the following behaviors within the past month (i.e., past 30 days) when using alcohol or ‘partying.’” These instructions differ slightly from the original instructions for the PBSS; an assessment window (‘within the past month’) was added to make the instructions more consistent with the other measures used in this study; this slight modification is based on suggestions by Pearson et al. (2012). The PBSS was originally scored on a 5-point, Likert-type scale; however, the present research followed more recent recommendations to use a 6-point Likert-type scale with anchors of 1 (*Never*) and 6 (*Always*; Martens et al., 2011; Martens et al., 2009). As previously mentioned, the PBSS contains three subscales that load on distinct factors: Stopping/Limiting Drinking (seven items, $\alpha = .81$), Manner of Drinking (five items, $\alpha = .70$), and Serious Harm Reduction (three items, $\alpha = .68$). Recent research has shown that of the popular measures of PBS use, the PBSS has the strongest factor structure and the strongest concurrent validity when predicting alcohol-

related problems (Pearson et al., 2012). Composite scores for each PBSS subscale were created by averaging scores for all items in the subscale; this method allowed more flexibility when dealing with missing responses. Each participant was given a single score for Stopping/Limiting Drinking, a single score for Manner of Drinking, and a single score for Serious Harm Reduction. Higher scores indicate more frequent use of the given strategy type.

Alcohol Consumption. Alcohol consumption was measured with a modified version of the Daily Drinking Questionnaire (DDQ; Collins, Park, Marlatt, 1985; see Appendix C). The DDQ assesses alcohol consumption using a Monday through Sunday grid that assesses daily alcohol consumption. For the present research, daily alcohol consumption on a typical drinking week within the past month was assessed. The stem for the modified DDQ stated, “Think about your drinking behaviors during the last month (i.e., past 30 days) for the following questions. With respect to alcohol consumption, 1 standard drink is equivalent to 12 oz beer OR 5 oz wine OR 1.5 oz shot of liquor straight or in a mixed drink.” The instructions for the DDQ stated, “We ask you to fill in the following grid with the typical number of standard drinks you consume each day of the week. Enter a '0' to indicate days on which you do not drink.” A composite score for alcohol consumption was created by averaging each participant’s number of drinks per drinking day on a typical week of drinking (identified by days when at least one drink was reported). This method yielded a measure of on average, how many drinks each participant consumed per drinking day during the past 30 days.

Alcohol-Related Problems. Alcohol-related problems were assessed with the Brief-Young Adult Alcohol Consequences Questionnaire (B-YAACQ; 24 items; Kahler,

Strong, & Read, 2005; see Appendix D). For the present research, the B-YAACQ was scored dichotomously in a checklist format, such that participants were asked to indicate which problems they have experienced within the past month. This method of assessment yielded a count of how many problems participants experienced over the past month, rather than an ordinal measure of how frequently each problem was experienced. The B-YAACQ items were internally consistent in the present research ($\alpha = .86$).

Demographics. Demographic information was assessed in order to include gender as a predictor variable and to determine the representativeness of the sample (see Appendix E). In addition to gender, participants were asked to report their race/ethnicity, age, class standing, marital status, and Greek affiliation.

CHAPTER III

RESULTS

DATA CLEANING

Random Responders. Prior to analysis, the dataset was checked for cases that appeared to be random responders. Random responders were identified using items that asked participants to respond a certain way (“Please select ‘Strongly Agree’ for this item” & “Please click ‘yes’ for this item”). These two items were entered into the assessment battery; participants that do not respond appropriately for both items were removed from the data set. Eighteen participants were removed from the dataset when using this method of screening.

Drinking Eligibility. Because the drinking variable of interest in the present research was the average number of drinks consumed on a drinking day on a typical week of drinking, light drinkers that reported no alcohol consumption on a typical week of drinking were removed from the analytic sample. Twenty-two participants reported consuming no alcohol on a typical week; their data were not used in any analysis. Combined with random-responders, a total of 40 participants from the original dataset were removed from the analytic sample, resulting in the final analytic sample of 313 participants.

DESCRIPTIVE STATISTICS

Means. Preliminary data analysis showed that participants reported consuming approximately four standard drinks per drinking day ($M = 4.01$, $SD = 2.89$) on a typical week of drinking. The distribution of the alcohol consumption variable can be seen in Figure 1. Participants reported using Serious Harm Reduction strategies ($M = 5.23$, $SD =$

0.94) more frequently than Stopping/Limiting Drinking strategies ($M = 3.24$, $SD = 1.11$) and Manner of Drinking strategies ($M = 3.61$, $SD = 1.03$). Participants reported experiencing an average of almost four alcohol-related problems ($M = 3.92$, $SD = 4.03$) within the past month.

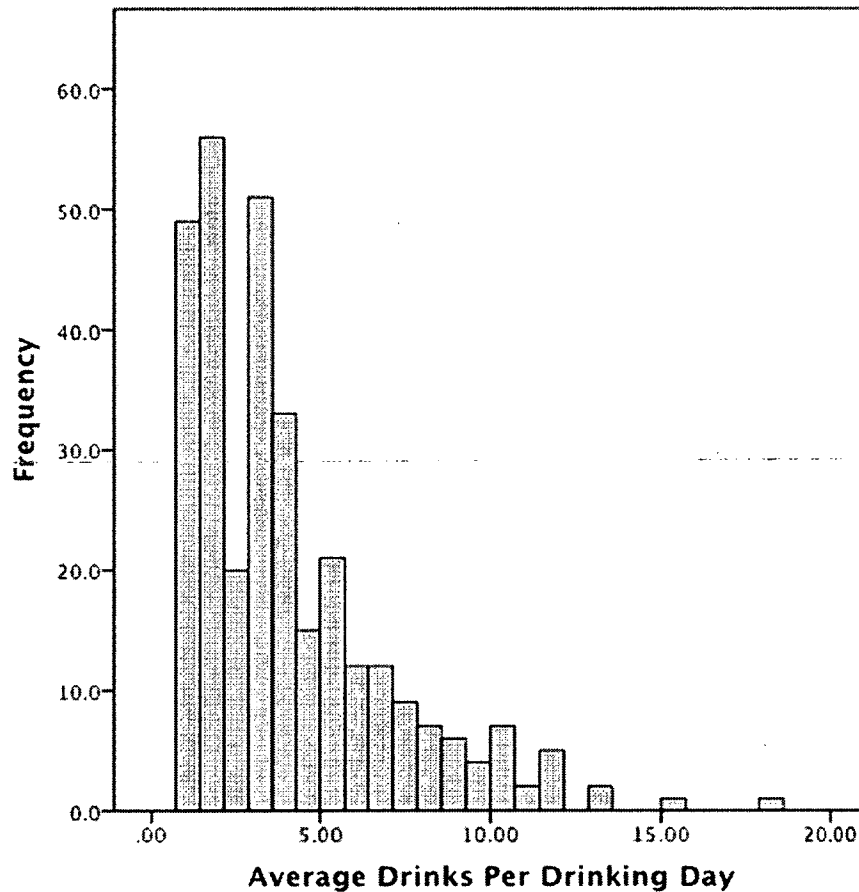


Figure 1. Distribution of average drinks per drinking day.

Correlations. Bivariate correlations were calculated so that the relationships between all study variables could be reported as well as to confirm the relationships found in previous research. It was expected that Stopping/Limiting Drinking, Manner of Drinking, and Serious Harm Reduction strategy use would each be negatively correlated

with alcohol-related problems. Further, it was expected that alcohol consumption would be positively correlated with alcohol-related problems. Relationships found previously in the literature were supported. All three types of protective behavioral strategies were negatively correlated with alcohol consumption and alcohol-related problems. Further, alcohol consumption was positively correlated with alcohol-related problems. Lastly, gender (0 = *male*, 1 = *female*) was negatively correlated with all types of protective behavioral strategies and alcohol consumption (see Table 1 for all correlations).

Table 1.

Bivariate correlations between study variables.

Variable	1.	2.	3.	4.	5.	6.
1. S/L Drinking						
2. Manner of Drinking	.52**					
3. Serious Harm Reduction	.19**	.23**				
4. Alcohol Consumption	-.37**	-.42**	-.13*			
5. Problems	-.28**	-.41**	-.24**	.36**		
6. SR Problems	-.31**	-.44**	-.21**	.39**	.94**	
7. Gender	.21**	.17**	.20**	-.26**	-.12*	-.12*

Note. N = 313. Gender (0 = Male, 1 = Female). ** $p < .01$, * $p < .05$. Problems = Alcohol-related problems. SR Problems = Square root transformed alcohol-related problems.

AIM ONE

Invariant Covariance Testing. Invariant covariance (i.e., equal covariance matrices for males and females) of the three-factor PBSS was tested in order to address Hypothesis 1a. I tested for invariant covariance by testing the null hypothesis that

covariance matrices for the three-factor PBSS are equal for males and females in the college student population. Covariance matrices for the three-factor PBSS were calculated for males and females, and then structural equation modeling (SEM) was used to test the matrices for equality. Two models were constructed using *Mplus 6* (Muthén & Muthén, 1998-2011): a model in which the covariance matrices for males and females were constrained to equality, and another model in which the covariance matrices were estimated freely. The results showed that the model with covariance matrices constrained to equality did not fit the data significantly worse than the model with freely estimated covariance matrices, $\chi^2(105, N = 313) = 108.97, p = .376$; thus, Hypothesis 1a was supported.

Configural Invariance Testing. Configural invariance was assessed by ensuring that the same pattern factor loadings exist for males and females. In order to create correctly specified CFA models, an indicator item was needed for each PBSS subscale. Each PBSS subscale had an indicator item that had a factor loading set to 1 for both males and females. The indicator item for the Stopping/Limiting Drinking subscale was “Determine not to exceed a set number of drinks” (PBSS 1). The indicator item for the Manner of Drinking subscale was “Avoid drinking games” (PBSS 8). The indicator item for the Serious Harm Reduction subscale was “Use a designated driver” (PBSS 13). I created a configural model for the three-factor PBSS and configural models for each individual PBSS subscale. The resulting configural model fit can be seen in Table 2. The results showed that the three-factor PBSS, Stopping/Limiting Drinking, and Serious Harm Reduction models did not meet common suggested criteria for good model fit (RMSEA < .06, CFI > .95, SRMR < .08; Hu & Bentler, 1999). The model with Manner

of Drinking strategies did fit the data well. The configural models were used as the null models when testing for metric invariance.

Table 2.

Configural Model Fit Indices for the PBSS and Individual Subscales.

Scale	Configural Models				
	χ^2	<i>df</i>	<i>RMSEA</i>	<i>CFI</i>	<i>SRMR</i>
PBSS	396.28	186	.085	.834	.078
S/LD	154.27	34	.150	.825	.086
MoD	16.45	14	.033	.990	.040
SHR	14.34	2	.199	.928	.076

Note. $N = 313$. PBSS = 15 items on three factors. S/LD = 7 item Stopping/Limiting Drinking scale. MoD = 5 item Manner of Drinking scale. SHR = 3 item Serious Harm Reduction scale.

Metric Invariance Testing. Metric invariance models were created by building models in which factor loadings for males and females were constrained to equality. Four metric invariance models were created (see Table 3). The first used the three-factor PBSS; the remaining three models used the individual PBSS subscales.

Hypothesis 1b was that factor loadings on the PBSS are equal for males and females. In order to test hypothesis 1b, model fit differences between the configural and metric models were evaluated. Chi-square difference testing showed that the metric model for the three-factor PBSS fit the data significantly worse than the configural model (see Table 4); therefore, hypothesis 1b was not supported. The three-factor PBSS did not meet the assumption of measurement invariance. The initial metric invariance test for the

three-factor PBSS was followed up by testing each individual subscale of the PBSS for metric invariance. The results showed that the Manner of Drinking subscale was the only subscale that fit the data significantly worse when all factor loadings were constrained to equality; therefore, the Manner of Drinking subscale did not meet the assumption of metric invariance (see Table 4). In other words, when the factor loadings on Manner of Drinking were constrained to equality, the model fit became significantly worse from the Manner of Drinking configural model.

Table 3.

Metric Model Fit Indices for the PBSS and Individual Subscales.

Scale	Metric Models				
	χ^2	<i>df</i>	<i>RMSEA</i>	<i>CFI</i>	<i>SRMR</i>
PBSS	417.84	198	.084	.826	.086
S/LD	162.15	40	.140	.822	.088
MoD	28.31	18	.060	.956	.071
SHR	16.45	4	.141	.928	.103

Note. $N = 313$. PBSS = 15 items on three factors. S/LD = 7 item Stopping/Limiting Drinking scale. MoD = 5 item Manner of Drinking scale. SHR = 3 item Serious Harm Reduction scale.

Table 4.

Difference Tests Between Configural and Metric Models.

Scale	Metric Models		Configural Models		Difference Testing		
	χ^2	<i>df</i>	χ^2	<i>df</i>	χ^2	<i>df</i>	<i>p</i>
PBSS	417.84	198	396.28	186	21.56	12	.043
S/LD	162.15	40	154.27	34	7.88	6	.247
MoD	28.31	18	16.45	14	11.86	4	.018
SHR	16.45	4	14.34	2	2.11	2	.347

Note. $N = 313$. PBSS = 15 items on three factors. S/LD = 7 item Stopping/Limiting Drinking scale. MoD = 5 item Manner of Drinking scale. SHR = 3 item Serious Harm Reduction scale.

Further Examination of the Manner of Drinking Scale. Because the Manner of Drinking subscale was found to be non-invariant across gender, I conducted additional tests to determine which item or items caused the scale to be non-invariant. I created five new CFA models with all 15 PBSS items loading on the three PBSS factors. In each model, a single item from the Manner of Drinking subscale was freely estimated and the remaining items were constrained to equality. In order to test item 8 for invariance, I created a model in which item 9 was used as a reference indicator. Chi-square difference testing was used to determine which model or models were significantly improved from the metric model (all items constrained to equality). The results showed that the model in which item 12 on the PBSS (Avoid trying to “keep up” or out-drink others) was estimated freely was significantly improved from the metric model (see Table 5). Item 12 had a higher factor loading for males (.741) than for females (.533). In sum, the three-

factor PBSS was not invariant across gender, and the lack of invariance can be attributed to a single item on the Manner of Drinking subscale that performed better with males.

Table 5.

Individual Item Analysis of the Manner of Drinking Subscale.

Item	Metric Model		Model with Item Free		Difference Testing		
	χ^2	<i>df</i>	χ^2	<i>df</i>	χ^2	<i>df</i>	<i>p</i>
PBSS 8	417.84	198	416.17	197	1.67	1	.196
PBSS 9	417.84	198	416.28	197	1.56	1	.211
PBSS 10	417.84	198	417.84	197	0.01	1	.929
PBSS 11	417.84	198	414.54	197	3.30	1	.069
PBSS 12	417.84	198	411.13	197	6.71	1	.010

Note. $N = 313$. Items can be seen in Appendix B.

Because there was an invariant item on the Manner of Drinking subscale, I tested the psychometric properties of a four-item measure of Manner of Drinking strategy use (items 8-11). A Manner of Drinking subscale created with those four items showed poor reliability ($\alpha = .61$); therefore, I decided not to remove item 12. Because the difference in factor loadings was not extreme, I addressed aims two and three using the original five-item Manner of Drinking subscale.

AIM TWO

Three separate regression models were used in order to address aim two of the present research. Each model was used to test a protective behavioral strategy subtype individually. Prior to analysis, all variables were mean-centered in order to facilitate the

inclusion of interaction terms, improve interpretability of the regression coefficients, and eliminate non-essential multicollinearity (Cohen, Cohen, West, & Aiken, 2003). For all regression models, the alcohol-related problems variable was transformed via a square-root transformation. This transformation made the positively skewed alcohol-related problems variable a more suitable criterion for the desired regression models.

Transforming alcohol-related problems allowed the models to meet the regression assumptions for correct specification of relationships with the criterion variable, normality of residuals, and homoscedasticity.

Stopping/Limiting Drinking Model. Hypothesis 2a was that Stopping/Limiting Drinking strategy use would not moderate the relationship between alcohol consumption and alcohol-related problems. In order to test this hypothesis, square-root transformed alcohol-related problems was regressed onto Stopping/Limiting Drinking strategy use, average alcohol consumption, and Stopping/Limiting Drinking Use X Average Alcohol Consumption. I expected that Stopping/Limiting Drinking strategy use and average alcohol consumption would have significant main effects when predicting alcohol-related problems and that the interaction term would *not* be a significant predictor. The results showed that the Stopping/Limiting Drinking use variable was a significant predictor of square-rooted alcohol-related problems, as was average alcohol consumption. Further, the interaction between Stopping/Limiting Drinking strategy use and average alcohol consumption was not a significant predictor of square-rooted alcohol-related problems; thus, Hypothesis 2a was supported (see Table 6). The relationship between alcohol consumption and alcohol-related problems (transformed back into the original metric) across different levels of Stopping/Limiting Drinking strategy use can be seen in Figure

2. Figure 2 shows changes in the relationship between alcohol consumption and alcohol-related problems across levels of Stopping/Limiting Drinking strategy use; however, those changes are not statistically significant.

Table 6.

Regression with S/LD Predicting Alcohol-Related Problems.

<i>Predictor</i>	<i>B</i>	<i>SE</i>	β	<i>p</i>	Partial η^2	Part η^2	VIF
Intercept	1.62	0.06		.000			
AC	0.11	0.02	.28	.000	.07	.06	1.33
S/LD	-0.22	0.06	-.22	.000	.05	.04	1.23
AC X S/LD	-0.03	0.02	-.08	.153	.01	.01	1.17

Note. $R^2 = .190$. Criterion = Square-root transformed alcohol-related problems. AC = Alcohol consumption. S/LD = Stopping/Limiting Drinking strategy use.

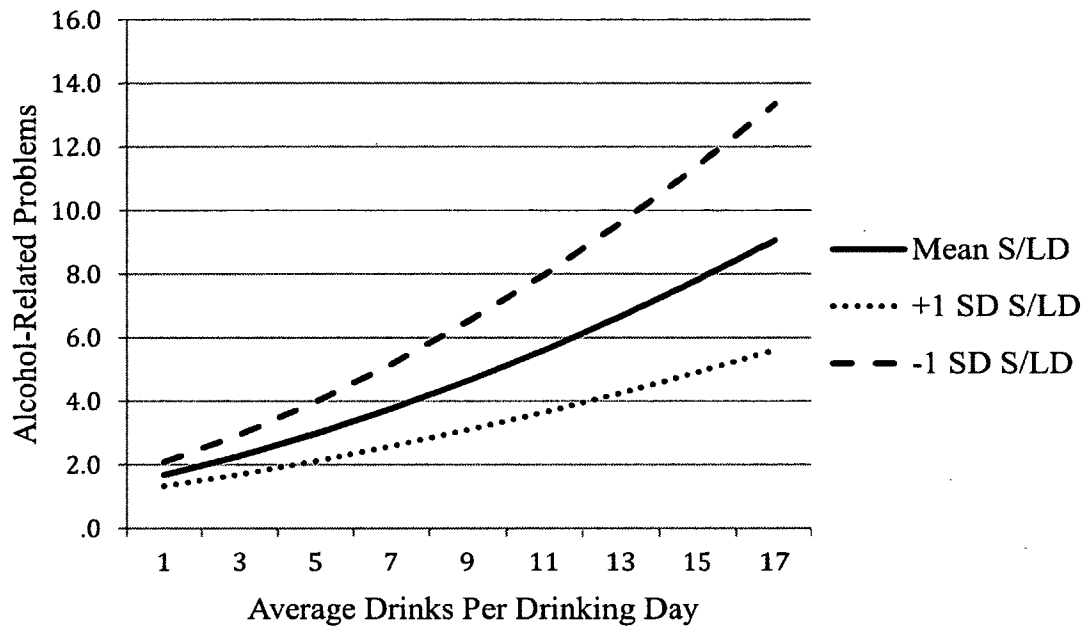


Figure 2. Relationship between average drinks per drinking day and alcohol-related problems across different levels of Stopping/Limiting Drinking strategy use.

Manner of Drinking Model. Hypothesis 2b was that Manner of Drinking strategy use would moderate the relationship between alcohol consumption and alcohol-related problems. In order to test hypothesis 2b, square-root transformed alcohol-related problems was regressed onto Manner of Drinking strategy use, average alcohol consumption, and Manner of Drinking Strategy Use x Average Alcohol Consumption. It was expected that Manner of Drinking strategy use and average alcohol consumption would have significant main effects when predicting alcohol-related problems and that the interaction term would also be a significant predictor. Specifically, it was expected that the results would show a buffering interaction, such that as Manner of Drinking strategy use increases the positive relationship between average alcohol consumption and square-rooted alcohol-related problems will become weaker. The results showed that the

Manner of Drinking use variable was a significant predictor of square-rooted alcohol-related problems, as was average alcohol consumption. Surprisingly, the interaction between squared Manner of Drinking strategy use and average alcohol consumption was not a significant predictor of square-rooted alcohol-related problems; thus, Hypothesis 2b was not supported (see Table 7). The relationship between alcohol consumption and alcohol-related problems (transformed back into the original metric) across different levels of Manner of Drinking strategy use can be seen in Figure 3.

Table 7.

Regression with MoD Predicting Alcohol-Related Problems.

<i>Predictor</i>	<i>B</i>	<i>SE</i>	β	<i>p</i>	Partial η^2	Part η^2	VIF
Intercept	-1.65	0.06		.000			
AC	0.09	0.02	.25	.000	.06	.05	1.29
MoD	-0.35	0.06	-.33	.000	.11	.09	1.22
AC X MoD	-0.00	0.02	-.01	.859	.00	.00	1.07

Note. $R^2 = .240$. Criterion = Square-root transformed alcohol-related problems. AC = Alcohol consumption. MoD = Manner of Drinking strategy use.

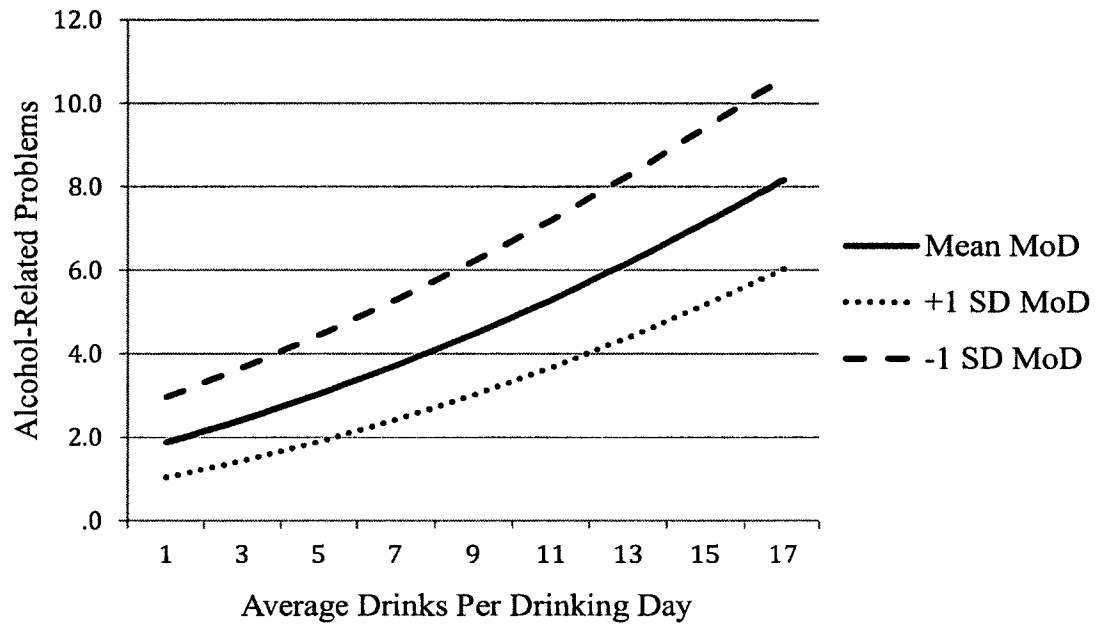


Figure 3. Relationship between average drinks per drinking day and alcohol-related problems across different levels of Manner of Drinking strategy use.

Serious Harm Reduction Model. Hypothesis 2c was that Serious Harm Reduction strategy use would moderate the relationship between alcohol consumption and alcohol-related problems. In order to test hypothesis 2c, square-rooted alcohol-related problems was regressed onto SHR strategy use, average alcohol consumption, and SHR Strategy Use x Average Alcohol Consumption. It was expected that SHR strategy use and average alcohol consumption would have significant main effects when predicting square-rooted alcohol-related problems and that the interaction term would also be a significant predictor. As with the Manner of Drinking model, it was expected that the results would show a buffering interaction. The results showed that SHR strategy use was a significant predictor of square-rooted alcohol-related problems, as was average alcohol consumption. The interaction between SHR strategy use and average alcohol

consumption was also a significant predictor; thus, Hypothesis 2c was supported (see Table 8). The relationship between alcohol consumption and alcohol-related problems (transformed back into the original metric) across different levels of Serious Harm Reduction strategy use can be seen in Figure 4.

Table 8.

Regression with SHR Predicting Alcohol-Related Problems.

<i>Predictor</i>	<i>B</i>	SE	β	<i>p</i>	Partial η^2	Part η^2	VIF
Intercept	1.63	0.06		.000			
AC	0.14	0.02	.36	.000	.14	.13	1.02
SHR	-0.17	0.06	-.15	.004	.03	.02	1.02
AC X SHR	-0.07	0.02	-.15	.003	.03	.02	1.01

Note. $R^2 = .197$. Criterion = Square-root transformed alcohol-related problems. AC = Alcohol consumption. SHR = Serious Harm Reduction strategy use.

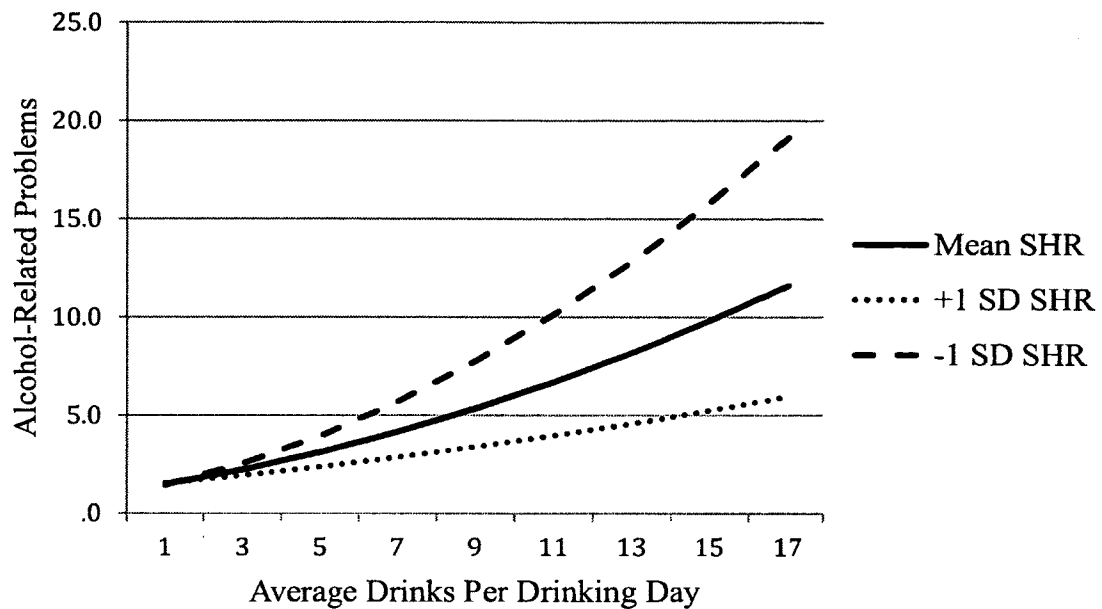


Figure 4. Relationship between average drinks per drinking day and alcohol-related problems across different levels of Serious Harm Reduction strategy use.

Figure 4 shows that frequent Serious Harm Reduction strategy use attenuates the relationship between alcohol consumption and alcohol-related problems. An alternative interpretation would be that the use of Serious Harm Reduction strategies becomes more predictive of alcohol-related problems as average alcohol consumption increases.

AIM THREE

The third aim of the present research was addressed with three separate regression models used to test for three-way interactions. In all models, continuous variables were mean-centered and gender was dummy coded (0 = *Male*, 1 = *Female*). As with the models used to test for two-way interactions, the alcohol-related problems variable was transformed via a square-root transformation.

Gender and Stopping/Limiting Drinking. Hypothesis 3a was that gender would not moderate the interaction between alcohol consumption and Stopping/Limiting

Drinking strategy use when predicting alcohol-related problems. In order to address this hypothesis, I tested for a three-way interaction between gender, alcohol consumption, and Stopping/Limiting Drinking strategy use when predicting alcohol-related problems. I created a regression model with seven predictors: all three main effects, three 2-way interactions, and the aforementioned three-way interaction were included as predictors. The results showed that the only significant predictors of alcohol-related problems were Stopping/Limiting Drinking strategy use and average alcohol consumption; thus, Hypothesis 3a was supported (see Table 9).

Table 9.

S/LD and Gender Predicting Alcohol-Related Problems.

<i>Predictor</i>	<i>B</i>	<i>SE</i>	β	<i>p</i>	Partial η^2	Part η^2	VIF
Intercept	1.60	0.09		.000			
AC	0.11	0.03	.30	.001	.04	.03	2.88
S/LD	-0.21	0.09	-.21	.023	.02	.01	3.21
Gender	-0.04	0.12	.02	.767	.00	.00	1.20
AC X S/LD	-0.03	0.03	-.09	.297	.00	.00	2.58
AC X Gender	-0.01	0.05	-.02	.848	.00	.00	2.17
S/LD X Gender	-0.01	0.12	-.01	.910	.00	.00	3.25
S/LD X Gender X AC	0.01	0.04	.01	.877	.00	.00	2.50

Note. $R^2 = .190$. Criterion = Square-root transformed alcohol-related problems. AC = Alcohol consumption. S/LD = Stopping/Limiting Drinking strategy use.

Gender and Manner of Drinking. Hypothesis 3b was that gender would moderate the interaction between alcohol consumption and Manner of Drinking strategy

use when predicting alcohol-related problems. In order to address this hypothesis, I tested for a three-way interaction between gender, alcohol consumption, and Manner of Drinking strategy use when predicting alcohol-related problems. I created a regression model with seven predictors: all three main effects, three 2-way interactions, and the aforementioned three-way interaction were included as predictors. The results showed that the only significant predictors of alcohol-related problems were Manner of Drinking strategy use and average alcohol consumption (see Table 10); therefore, hypothesis 3b was not supported.

Table 10.

MoD and Gender Predicting Alcohol-Related Problems.

<i>Predictor</i>	<i>B</i>	<i>SE</i>	β	<i>p</i>	Partial η^2	Part η^2	VIF
Intercept	1.66	0.09		.000			
AC	0.12	0.09	-.29	.001	.04	.03	2.92
MoD	-0.31	0.03	.32	.000	.05	.04	2.59
Gender	-0.03	0.12	-.02	.777	.00	.00	1.18
AC X MoD	0.02	0.02	.05	.468	.00	.00	2.15
AC X Gender	-0.05	0.05	-.07	.307	.00	.00	2.12
MoD X Gender	-0.10	0.12	-.07	.409	.00	.00	2.81
MoD X Gender X AC	-0.05	0.04	-.09	.222	.00	.00	2.05

Note. $R^2 = .246$. Criterion = Square-root transformed alcohol-related problems. AC = Alcohol consumption. MoD = Manner of Drinking strategy use.

Gender and Serious Harm Reduction. Hypothesis 3c was that gender would moderate the interaction between alcohol consumption and Serious Harm Reduction

strategy use when predicting alcohol-related problems. In order to address this hypothesis, I tested for a three-way interaction between gender, alcohol consumption, and Serious Harm Reduction strategy use when predicting alcohol-related problems. I created a regression model with seven predictors: all three main effects, three 2-way interactions, and the aforementioned three-way interaction were included as predictors. The results showed that the significant predictors of alcohol-related problems were Serious Harm Reduction strategy use, average alcohol consumption, and the Alcohol Consumption X Serious Harm Reduction strategy use interaction; thus, Hypothesis 3c was not supported (see Table 11).

Table 11.

SHR and Gender Predicting Alcohol-Related Problems.

<i>Predictor</i>	<i>B</i>	<i>SE</i>	β	<i>p</i>	Partial η^2	Part η^2	VIF
Intercept	1.61	0.09		.000			
AC	0.14	0.03	.36	.000	.08	.07	1.84
SHR	-0.15	0.10	-.13	.126	.01	.01	2.72
Gender	0.04	0.12	.02	.737	.00	.00	1.11
AC X SHR	-0.07	0.03	-.17	.029	.02	.01	2.16
AC X Gender	0.01	0.04	.01	.877	.00	.00	1.82
SHR X Gender	-0.04	0.13	-.03	.757	.00	.00	2.57
SHR X Gender X AC	0.01	0.05	.01	.906	.00	.00	2.12

Note. $R^2 = .198$. Criterion = Square-root transformed alcohol-related problems. AC = Alcohol consumption. SHR = Serious Harm Reduction strategy use.

CHAPTER IV

DISCUSSION

PURPOSE

The purpose of the present research was to make unique contributions to the PBS literature. There were three aims for the present research. The first aim was to determine if the Protective Behavioral Strategies Survey (PBSS) is invariant across gender. The second aim was to determine what individual types of protective behavioral strategies moderate (or buffer) the relationship between alcohol consumption and alcohol-related problems. The third and final aim of the present research was to determine if the moderation effect of PBS use is different across gender. Addressing these aims provides insight into how certain types of protective behavioral strategies can be used to reduce alcohol-related problems.

MEASUREMENT INVARIANCE OF THE PBSS

Findings. In the present research, the PBSS was not invariant across gender. Hypothesis 1a was supported; however, Hypothesis 1b was not. Confirmatory factor analysis showed that all factor loadings of the PBSS are not the same for males and females. This suggests that the PBSS is assessing PBS use differently for males and females. In order to investigate the non-invariance of the PBSS, the individual subscales were examined for measurement invariance. More detailed analysis showed that the Manner of Drinking subscale of the PBSS is the only subscale that is not invariant across gender. The non-invariance of the Manner of Drinking subscale was attributed to a single item (Avoid trying to “keep up” or out-drink others), this item had a strong factor loading for males, but not females. This finding suggests that avoiding trying to keep up

or out-drink others (competition drinking) is less indicative of Manner of Drinking strategy use for females than it is for males. The importance of competition drinking for males is consistent with previously literature stating that drinking to intoxication is perceived as “macho” in U.S. society (Young, Morales, McCabe, Boyd, & D’Arcy, 2005) and drinkers that fail to meet standards of high alcohol consumption may be perceived as less manly (Lemle & Mishkind, 1989). Interestingly, Young and colleagues also state that some college student females feel the pressure “drink like a man” (i.e., drinking heavily to become intoxicated). This finding could explain why the gender difference in factor loadings for the “Avoid trying to “keep up” or out-drink others” item was not extreme. Researchers using the original 15-item PBSS should be aware of the non-invariance when making gender comparisons across Manner of Drinking strategy use. The Manner of Drinking subscale was non-invariant across gender; however, the impact of the non-invariance is likely minimal because factor loadings for both males and females were $> .50$.

Non-Invariant Item. Researchers may still wish to use an invariant measure of Manner of Drinking strategy use. There are two ways to deal with a non-invariant item that are discussed in the literature. One option is to delete the non-invariant item; the other option is to use a partial invariance model to freely estimate non-invariant loadings (Vandenberg & Lance, 2000). In the present research I choose not to delete the non-invariant item. Deleting an item from a scale with few items can drastically change a scale’s psychometric properties (Nye & Drasgow, 2011). In the present research, deleting the non-invariant item resulted in unacceptable internal consistency for the remaining four Manner of Drinking items. Further research could be used develop an

invariant set of items to measure Manner of Drinking strategy use that is internally consistent. Rather than deleting the non-invariant item, I elected to use a partial invariance model if necessary. Manner of Drinking strategies did not interact with alcohol consumption and gender when predicting alcohol-related problems, therefore I chose not to follow up that test with further examination using a partial invariance model.

PBS SUBTYPES AS MODERATORS

In an attempt to expand on the findings of Benton et al. (2004), I examined different subtypes of protective behavioral strategies as moderators of the relationship between alcohol consumption and alcohol-related problems. My results showed that one strategy subtype showed a moderation effect, whereas the other two subtypes did not. The present research showcases the importance of examining individual PBS subtypes.

Stopping/Limiting Drinking. In accordance with Hypothesis-2a, the results of the present research showed that Stopping/Limiting Drinking strategy use is not a moderator of the relationship between average alcohol consumption and alcohol-related problems. The support of hypothesis 2a supports my previous statement that protective behavioral strategies that affect how much alcohol is consumed do not moderate (or buffer) the relationship between alcohol consumption and negative consequences from drinking. However, this finding does not suggest that Stopping/Limiting Drinking strategies are not effective. Stopping/Limiting Drinking strategy use was negatively correlated with alcohol consumption and alcohol-related problems, and it predicted alcohol-related problems above and beyond what was explained by alcohol consumption. This means that when alcohol consumption is held constant, Stopping/Limiting Drinking strategies are negatively related to alcohol-related problems. Based on the results of the

present research, frequent use of Stopping/Limiting Drinking strategies does not reduce the harmful effects of high levels of alcohol consumption.

Manner of Drinking. Contrary to Hypothesis 2b, Manner of Drinking strategy use was not a moderator of the relationship between alcohol consumption and alcohol related problems. This finding suggests that frequent use of Manner of Drinking strategies is not associated with a reduced relationship between alcohol consumption and alcohol-related problems; therefore, frequent use of Manner of Drinking strategies should not reduce the emphasis that college student drinkers place on controlling the alcohol consumption. When formulating hypothesis 2b of a moderating effect of Manner of Drinking strategies, my reasoning was that strategies used to affect how alcohol is consumed should buffer the relationship between consumption and problems. The classification of Manner of Drinking strategies as strategies that affect how alcohol is consumed may have been incorrect. Perhaps strategies used to avoid drinking games or avoid trying to keep up or out drink others should be considered behaviors that indirectly affect how much alcohol is when drinking consumed. I suspect that by avoiding drinking games or competitive drinking, college students are reducing their consumption and/or blood alcohol concentration (BAC); this could explain why there was no significant interaction between the Manner of Drinking strategy use and alcohol consumption variables. Despite the fact that Manner of Drinking strategy use was not a moderator, the results of the present research suggest that Manner of Drinking strategies can still be useful. Regression analysis showed that 11% of the unique variance in alcohol-related problems was accounted for by unique variance in Manner of Drinking strategy use.

Manner of Drinking strategy use predicts alcohol-related problems above and beyond what is explained by alcohol-consumption alone.

Serious Harm Reduction. In accordance with Hypothesis 2c, Serious Harm Reduction strategy use was a moderator of the relationship average alcohol consumption and alcohol-related problems. The results showed that higher levels of Serious Harm Reduction strategy use were associated with a weaker relationship between alcohol consumption and alcohol-related problems. This finding supports my previous statement that drinking strategies that affect how alcohol is consumed moderate the relationship between alcohol consumption and alcohol-related problems. Among college students that use Serious Harm Reduction strategies frequently, there is a weaker relationship between how much alcohol they consume per drinking day and how many alcohol-related problems they experience. Frequently using strategies such as keeping track of where your drink has been, avoiding traveling home alone, or using a designated driver are likely to reduce the risk of many negative outcomes that are commonly associated with high alcohol consumption, hence the buffering moderation effect found in the present research. Based on the results of the present research, it appears as though students can protect themselves from experiencing alcohol-related problems when consuming high amounts of alcohol by using Serious Harm Reduction strategies.

GENDER DIFFERENCES

PBS Use, Alcohol Consumption, and Problems. Consistent with previous research (D'Lima, Pearson, & Kelley, 2012), the results of the present study showed that females report more frequent use of Stopping/Limiting Drinking, Manner of Drinking, and Serious Harm Reduction strategies. Further, the results of the present research

showed that males consume more drinks per drinking day than females. This finding is consistent with previous research that found that males consume more alcohol than females (Benton et al., 2004; Lewis & Neighbors, 2004). Contributing to the mixed findings on the relationship between gender and alcohol-related problems, the results of the present research suggest that males report experiencing more alcohol-related problems than females. Because males consume more alcohol and use protective behavioral strategies less frequently, it seems theoretically consistent that males would report experiencing more alcohol-related problems.

Gender as a Moderator. The results in the present research showed that gender does not moderate the interaction between alcohol consumption and any type of PBS use (as identified by the PBSS). The three-way interaction between PBS use, alcohol consumption, and gender found by Benton et al. (2004) was not supported in the present research. The discrepancy between the findings in the present research and the findings by Benton and colleagues could simply be due to the differences in sample size. Benton and colleagues recruited approximately 4,000 participants, whereas I had a sample of 313. Regardless, my sample size was adequate enough to detect a meaningful effect. Essentially no unique variance in alcohol-related problems was explained by the interactions between gender, average alcohol consumption, and any PBS type. These finding suggests that protective behavioral strategies that moderate the relationship between alcohol consumption and alcohol-related problems are effective for both males and females. To the best of my knowledge, no researchers have provided a strong theoretical argument as to why gender should moderate the interaction between PBS use

and alcohol-related problems; the results of my research suggest that no meaningful moderation effect exists.

IMPLICATIONS FOR PREVENTION EFFORTS

Potential Implications of the Present Research. Protective behavioral strategies are behaviors that individuals can use to reduce the likelihood of experiencing negative consequences from drinking. The findings from the present research can be particularly important for individuals seeking to prevent alcohol-related problems among college students that are not interested in reducing alcohol consumption or avoiding drinking situations. Specifically, in the present research I demonstrated that there is a certain subset of protective behaviors that can be used to buffer the relationship between alcohol consumption and alcohol-related problems. The idea of PBS use as a buffer of the relationship between alcohol consumption and alcohol-related problems is consistent with the harm reduction approach to reducing negative outcomes from drinking. Because alcohol consumption is such a common occurrence on college campuses (Johnston, O'Malley, Bachman, & Schulenberg, 2010) and prevention efforts designed to reduce alcohol consumption do not necessarily reduce alcohol-related problems (e.g., Larimer et al., 2001), researchers have begun to focus on behaviors that college students can use to reduce the negative consequences of alcohol consumption (Martens et al., 2004). The results of the present research contribute to the literature of the harm reduction approach.

Serious Harm Reduction Strategies. The findings of the present research could help to improve existing prevention efforts designed to promote PBS use in order to reduce alcohol-related problems. For college students that are not interested in reducing in alcohol consumption, or cannot limit consumption, Serious Harm Reduction protective

behavioral strategies should be recommended. The findings of the present research suggest that these strategies can reduce the harmful effects of high levels of alcohol consumption. Further, because gender did not moderate the interaction between alcohol consumption and Serious Harm Reduction strategy use, one should expect these strategies to have the same buffering effect for males and females.

Stopping/Limiting Drinking and Manner of Drinking Strategies. My results suggest that Stopping/Limiting Drinking and Manner of Drinking strategies do not reduce the relationship between alcohol consumption and problems; therefore, college students that consume high amount of alcohol should not rely solely on the use of these strategies when trying to reduce their alcohol-related problems. Despite the fact that Stopping/Limiting Drinking and Manner of Drinking strategies were not moderators of the relationship between alcohol consumption and alcohol-related problems, the use of those strategies still predict alcohol-related problems. Consistent with previous research (Delva et al., 2004; Martens et al., 2004; Patrick et al., 2011), the present study showed that these strategies predicted alcohol-related problems above and beyond what is explained by alcohol consumption alone; therefore, these strategies should still be recommended. Importantly, Manner of Drinking strategy use was the strongest predictor of alcohol-related problems, it accounted for more unique variance in alcohol-related problems than did alcohol consumption.

DIRECTIONS FOR FUTURE RESEARCH

Replication of Findings. Future research should be used to attempt to replicate the findings of the present research. Replication using college students sampled from different universities is especially important in order to demonstrate generalizability to

the entire college student population. Researchers could examine the relationships explored in the present research using different measures of PBS use, alcohol consumption, and alcohol-related problems. Further, researchers could use an alternative method of assessment of the study variables. Replication of the present research would show that the relationships found in this study are consistent and can be found in a variety of settings.

Invariance of PBS Measures. The entire PBSS was not invariant across gender in the present research. Based on the results of the present research, focus should be placed on finding an invariant measure of Manner of Drinking protective behavioral strategies. Further, other measures of PBS use (e.g., the Strategy Questionnaire; Sugarman & Carey, 2007) should be assessed for measurement invariance across gender. When researchers create a measure of college-student drinking behavior, they should evaluate measurement invariance as part of the measurement creating process.

Examining Individual Types of Protective Behavioral Strategies. In the present research, moderation effects were found for certain types of protective behavioral strategies, but not others. This finding shows that in certain contexts a multi-dimensional approach to PBS use operationalization is best. Specific to the PBSS, all three subscales show the same relationships with alcohol consumption and alcohol-related problems; however, when assessed as moderators, these strategies showed different effects. I encourage researchers to examine individual types of protective behavioral strategies in the future, especially when testing beyond simple bivariate relationships. Future research should evaluate moderation or mediation effects found with PBS use utilizing a multi-factor assessment of PBS use.

Experimental Design. In order to test Serious Harm Reduction strategy use as a moderator of the relationship between alcohol consumption and alcohol-related problems, researchers could utilize an experimental design with an intervention. Researchers could randomly assign participants to either a control group or an experimental group that receives a training programs designed to promote Serious Harm Reduction strategy use. Such a design would allow researchers to determine if increased Serious Harm Reduction PBS use reduces the predictive relationship between alcohol consumption and alcohol-related problems. Creating a more complex design, an additional experimental group could receive Stopping/Limiting Drinking and/or Manner of Drinking strategy training; this would provide an experimental evaluate of the present research. Such a design would allow stronger inferences to be made.

LIMITATIONS

There are numerous limitations for the present research. First and foremost, the present research used a cross-sectional design that does not allow causal inferences to be made. Further, the assessment of drinking behaviors was completely retrospective, requiring participants to recall drinking behavior over the past month. This method of assessment provides a measure of how much participants think they drank and how often they think they used certain strategies. Participants were conveniently sampled from a single university; attempting to generalize the findings of the present research to the entire college student population is inappropriate. Mono-method assessment bias is another limitation in the present research. All study variables were measured via an online survey; a constant method of assessment for all study variables can bias and inflate the relationships between variables (Furr & Bacharach, 2008). Lastly, the measure of

alcohol-related problems used in this study could be considered a limitation. In the present research I assessed how many problems participants experienced within the past month, rather than how frequently they experienced each problem. The frequency of alcohol-related problems might be a more important outcome variable when compared to the number of problems experienced. In my research, information about how many times participants experienced each problem was not obtained.

CHAPTER V

CONCLUSIONS

The results from the present research show that the use of Serious Harm Reduction protective behavioral strategies (e.g., using a designated driver, or not leaving a drink unattended) moderates the relationship between alcohol consumption and alcohol-related problems. This finding is particularly important for those looking to provide safety information for college students that consume high amounts of alcohol. The use of Serious Harm Reduction strategies can be used to buffer (or attenuate) the positive relationship between alcohol consumption and alcohol-related problems for those that consume high amounts of alcohol. College students that consume high amount of alcohol and are either unable or unwilling to reduce their alcohol consumption should be educated on how to use Serious Harm Reduction strategies.

The other two types of protective behavioral strategies explored in the present research, Stopping/Limiting Drinking and Manner of Drinking strategies, were not moderators; however, they can still have utility. Both of these strategies were significant predictors of alcohol-related problems, even above and beyond what can be explained by alcohol consumption. Stopping/Limiting Drinking and Manner of Drinking strategies might be more useful for light to moderate drinkers that want to limit how much they drink and the manner in which they drink.

A gender difference in Serious Harm Reduction use as a moderator was not found in the present research. This means that contrary to the results of Benton et al. (2004), protective behavioral strategies that moderate the relationship between alcohol consumption and alcohol-related problems do not have a stronger moderating effect for

males. Further, the present research showed that the PBSS is not invariant across gender. Additional analysis showed that the measurement of Manner of Drinking strategy use is not invariant across gender. Researchers should be aware of the requirement of measurement invariance when seeking to make inferences about differences across groups.

REFERENCES

- Araas, T. E. & Adams, T. B. (2008). Protective behavioral strategies and negative alcohol-related consequences in college students. *Journal of Drug Education*, 38(3), 211-224.
- Benton, S. L., Schmidt, J. L., Newton, F. B., Shin, K., Benton, S. A., & Newton, D. W. (2004). College student protective strategies and drinking consequences. *Journal of Studies on Alcohol*, 65, 115–121.
- Borden, L. A., Martens, M. P., McBride, M. A., Sheline, K. T., Bloch, K. K., & Dude, K. (2011). The role of college students' use of protective behavioral strategies in the relation between binge drinking and alcohol-related problems. *Psychology of Addictive Behaviors*, 25(2), 346-351. doi:10.1037/a0022678
- Cohen, J. (1988). *Statistical power analysis for the behavioral sciences*. (2nd ed.). Hillsdale, NJ: Erlbaum.
- Cohen, J., Cohen, P., West, S. G., & Aiken, L. S. (2003). *Applied multiple regression/correlation analysis for the behavioral sciences* (3rd ed.). Mahwah, NJ: Erlbaum.
- Collins, R. L., Parks, G., & Marlatt, G. (1985). Social determinants of alcohol consumption: The effects of social interaction and model status on the self-administration of alcohol. *Journal of Consulting and Clinical Psychology*, 53, 189–200. doi:10.1037/0022-006X.53.2.189
- Curcio, A. L., & George, A. M. (2011). Selected impulsivity facets with alcohol use/problems: The mediating role of drinking motives. *Addictive Behaviors*, 36, 959-964.

- D'Lima, G. M., Pearson, M. R., & Kelley, M. L. (2012). Protective behavioral strategies as a mediator and moderator of the relationship between self-regulation and alcohol-related outcomes in first-year college students. *Psychology of Addictive Behaviors, 26*, 330-337. doi: 10.1037/a0026942.
- Delva, J. D., Smith, M. P., Howell, R. L., Harrison, D. F., Wilke, D., & Jackson, D. L. (2004). A study of the relationship between protective behaviors and drinking consequences among undergraduate college students. *Journal of American College Health, 53(1)*, 19-27.
- Demartini, K. S., Carey, K. B., Lao, K., & Luciano, M. (2011). Injunctive norms for alcohol-related consequences and protective behavioral strategies: Effects of gender and year in school. *Addictive Behaviors, 36(4)*, 347-353.
- Faul, F., Erdfelder, E., Lang, A. G., & Buchner, A. (2007). G*Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behavior Research Methods, 39*, 175-191.
- Furr, R. M., & Bacharach, V. R. (2008). *Psychometrics: An Introduction*. Thousand Oaks, CA: Sage Publications.
- Gonzalez, V. M., Reynolds, B., & Skewes, M. C. (2011). Role of impulsivity in the relationship between depression and alcohol problems among emerging adult college drinkers. *Experimental and Clinical Psychopharmacology*. Advance online publication. doi: 10.1037/a0022720
- Graham, K., Wilsnack, R., Dawson, D., & Vogeltanz, N. (1998). Should alcohol consumption measures be adjusted for gender differences? *Addiction, 93*, 1137-1147. doi: 10.1046/j.1360-0443.1998.93811372.x

- Hingson, R. W., Heeren, T., Winter, M., & Wechsler, H. (2005). Magnitude of alcohol-related mortality and morbidity among U.S. college students ages 18-24: Changes from 1998 to 2001. *Annual Review of Public Health, 26*, 259-279.
- Hingson, R., Zha, W., & Weitzman, E. R. (2009). Magnitude of alcohol-related mortality and morbidity among U.S. college students ages 18-24: Changes from 1999–2005. *Journal of Studies on Alcohol and Drugs, Suppl. 16*, 12–20.
- Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indices in covariance structure analysis: Conventional versus new alternatives. *Structural Equation Modeling, 6*, 1-55. doi: 10.1080/10705519909540118
- Johnston, L. D., O'Malley, P. M., Bachman, J. G., & Schulenberg, J. E. (2010). *Monitoring the Future national survey results on drug use, 1975–2009. Volume II: College students and adults ages 19-50* (NIH Publication No. 10-7585). Bethesda, MD: National Institute on Drug Abuse.
- Johnston, L. D., O'Malley, P. M., Bachman, J. G., & Schulenberg, J. E. (2012). *Monitoring the Future national survey results on drug use, 1975-2011. Volume II: College students and adults ages 19-50*, Ann Arbor: Institute for Social Research, The University of Michigan.
- Kite, B. A., Pearson, M. R., & Henson, J. M. (2013). The assessment of protective behavioral strategies: Comparing the absolute frequency and contingent frequency response scales. *Psychology of Addictive Behaviors*. doi: 10.1037/a0031366
- Knight, J. R., Wechsler, H., Kuo, M., Seibring, M., Weitzman, E. R., & Schuckit, M. A. (2002). Alcohol abuse and dependence among U.S. college students. *Journal of Studies on Alcohol, 63*, 263–270.

- LaBrie, J. W., Lac, A., Kenney, S. R., & Mirza, T. (2011). Protective behavioral strategies mediate the effect of drinking motives on alcohol use among heavy drinking college student: Gender and race differences. *Addictive Behaviors, 36*, 354-361.
- Larimer, M. E., Turner, A. P., Anderson, B. K., Fader, J. S., Kilmer, J. R., Palmer, R. S., & Cronce, J. M. (2001). Evaluating a brief alcohol intervention with fraternities. *Journal of Studies on Alcohol, 62*(3), 370–380.
- Lemle, R., & Mishkind, M. E. (1989). Alcohol and masculinity. *Journal of Substance Abuse Treatment, 6*, 213–222. doi:10.1016/0740-5472(89)90045-7
- Lewis, M. A., & Neighbors, C. (2004). Gender-specific misperceptions of college student drinking norms. *Psychology of Addictive Behaviors, 18*, 334-339.
- Lewis, M. A., Rees, M., & Lee, C. M. (2009). Gender-Specific Normative Perceptions of Alcohol-Related Protective Behavioral Strategies. *Psychology of Addictive Behaviors, 23*(3) 539-545. doi; 10.1037/a0015176
- Martens, M. P., Ferrier, A. G., Sheehy, M. J., Corbett, K., Anderson, D. A., & Simmons, A. (2005). Development of the Protective Behavioral Strategies Survey. *Journal of Studies on Alcohol, 66*, 698-705.
- Martens, M. P., Karakashian, M. A., Fleming, K. M., Fowler, R. M., Hatchett, E. S., & Cimini, D. M. (2009). Conscientiousness, protective behavioral strategies, and alcohol use: Testing for mediating effects. *Journal of Drug Education, 39*(3). 273-287.
- Martens, M. P., Martin, J. L., Hatchett, E. S., Fowler, R. M., Fleming, K. M., Karakashian, M. A., & Cimini, M. D. (2008). Protective behavioral strategies and

the relationship between depressive symptoms and alcohol-related negative consequences among college students. *Journal of Counseling Psychology*, 55, 535–541, doi:10.1037/a0013588

Martens, M. P., Martin, J. L., Littlefield A. K., Murphy, J. G., & Cimini, M. D. (2011).

Changes in protective behavioral strategies and alcohol use among college students. *Drug and Alcohol Dependence*, 118, 504-507.

Martens, M. P., Pederson, E. R., LaBrie, J. W., Ferrier, A. G., & Cimini, M. D. (2007).

Measuring alcohol-related protective behavioral strategies among college students: Further examination of the Protective Behavioral Strategies Scale. *Psychology of Addictive Behaviors*, 21(3), 307-315.

Martens, M. P., Taylor, K. K., Damann, K. M., Page, J. C., Mowry, E. S., & Cimini, M.

D. (2004). Protective behavioral strategies when drinking alcohol and their relationship to negative alcohol-related consequences in college students. *Psychology of Addictive Behaviors*, 18(4), 390-393.

Moeller, S. J. & Crocker, J. (2009). Drinking and desired self-images: Path models of

self-image goals, coping motives, heavy-episodic drinking, and alcohol problems. *Psychology of Addictive Behaviors*, 23(2), 334-340.

Muthén, L. K., & Muthén, B. O. (1998-2011). Mplus User's Guide. Sixth Edition. Los Angeles, CA: Muthén & Muthén.

Neal, D. J., Corbin, W. R., & Fromme, K. (2006). Measurement of alcohol-related consequences among high school and college students: Application of item response models to the Rutgers Alcohol Problem Index. *Psychological Assessment*, 18(4), 402-414.

- Novik, M. G., & Boekeloo, B. O. (2011). Dimensionality and psychometric analysis of an alcohol protective behavioral strategies scale. *Journal of Drug Education, 41*, 65-78. doi: 10.2190/DE.41.1.d
- Nye, C. D., & Drasgow, F. (2011). Effect size indices for analyses of measurement equivalence: Understanding the practical importance of difference between groups. *Journal of Applied Psychology, 96*, 966-980.
- Park, C. L., & Grant, C. (2005). Determinants of positive and negative consequences of alcohol consumption in college students: alcohol use, gender, and psychological characteristics. *Addictive Behaviors, 30(4)*, 755-765.
- Patrick, M. E., Lee, C. M., & Larimer, M. E. (2011). Drinking motives, protective behavioral strategies, and experienced consequences: Identifying students at risk. *Addictive Behaviors, 36*, 270-273. doi:10.1016/j.addbeh.2010.11.007
- Pearson, M. R., Kite, B. A., & Henson, J. M. (2012). The assessment of protective behavioral strategies: Comparing prediction and factor structures across measures. *Psychology of Addictive Behaviors, 26(3)*, 573-584.
- Sugarman, D. E., & Carey, K. B. (2007). The relationship between drinking control strategies and college student alcohol use. *Psychology of Addictive Behaviors, 21(3)*, 338-345.
- Sugarman, D. E., & Carey, K. B. (2009). Drink less or drink slower: The effects of instruction on alcohol consumption and drinking control strategy use. *Psychology of Addictive Behaviors, 23(4)*, 577-585.

- Vandenburg, R. J., & Lance, C. E. (2000). A review and synthesis of the measurement invariance literature: Suggestions, practices, and recommendations for organizational research. *Organizational Research Methods, 3*(1), 4-70.
- Wechsler, H., Lee, J. E., Kuo, M., Seibring, M., Nelson, T. F., & Lee, H. (2002). Trends in college binge drinking during a period of increased prevention efforts. *Journal of American College Health, 50*, 203-217. doi: 2002-12885-002.
- Young, A. M., Morales, M., McCabe, S. E., Boyd, C. L., & D'Arcy, H. (2005). Drinking like a guy: Frequent binge drinking among undergraduate women. *Substance Use & Misuse, 40*, 241–267. doi:10.1081/JA-200048464

APPENDIX A

NOTIFICATION STATEMENT

PROJECT TITLE: Project Bravo

INTRODUCTION

The purpose of this form is to give you information that may affect your decision whether to say YES or NO to participation in the online study entitled "Project Problems", and to acquire consent from those individuals who choose to participate. It is your responsibility to inform the experimenter if you wish to discontinue your participation.

RESEARCHERS

James M. Henson, Ph.D., Assistant Professor, College of Sciences, Psychology Department

Benjamin A. Kite, B.S., Graduate Student, College of Sciences, Psychology Department

DESCRIPTION OF RESEARCH STUDY

The primary purpose of this study is to examine personality-related variables and drinking behaviors. Participation in this study will require you to fill out an online survey using a computer, and it will take approximately 30 minutes to complete.

EXCLUSIONARY CRITERIA

You must be at least 18 years of age and have consumed alcohol at least once in the past 30 days to participate in this study.

RISKS AND BENEFITS

RISKS: The potential risks are those similar to normal computer viewing and usage. In addition, participants are asked to report their personal behaviors; this may cause some psychological discomfort. You are free to leave any question blank that you do not feel comfortable answering.

BENEFITS: There are no direct benefits for participating in this study.

COSTS AND PAYMENTS

The researchers want your decision about participating in this study to be absolutely voluntary. There will be no costs to you, nor any monetary payments. Participation in this study will give you 0.5 Psychology Department Research Credit, which may be applied for extra credit in certain Psychology courses. Equivalent credits may be obtained in other ways. You do not have to participate in this study, or any Psychology Department study, in order to obtain this credit.

NEW INFORMATION

If the researchers find new information during this study that would reasonably change your decision about participating, then they will give it to you.

ANONYMITY

All information obtained about you in this study is strictly ANONYMOUS unless disclosure is required by law. The results of this study may be used in reports, presentations and publications, but the researcher will not identify you. We do not ask for any identifying information, so your responses cannot be traced back to you.

WITHDRAWAL PRIVILEGE

It is OK for you to say NO. Even if you say YES now, you are free to say NO later, and walk away or withdraw from the study at any time. Your decision will not affect your relationship with Old Dominion University, or otherwise cause a loss of benefits to which you might otherwise be entitled.

COMPENSATION FOR ILLNESS AND INJURY

By clicking the "Next" button below, then your consent in this document does not waive any of your legal rights. However, in the event of harm or injury arising from this study, neither Old Dominion University nor the researchers are able to give you any money, insurance coverage, free medical care, or any other compensation for such injury. In the event that you suffer injury as a result of participation in this research project, you may contact Dr. James Henson at 757-683-5761, the lead investigator, who will be glad to review the matter with you.

VOLUNTARY CONSENT

By clicking the "Next" button below, you are saying several things. You are saying that you have read this form or have had it read to you, that you are satisfied that you understand this form, the research study, and its risks and benefits. The researchers should have answered any questions you may have had about the research. If you have any questions later on, then the researchers should be able to answer them:

Dr. James Henson. 757-683-5761. jhenson@odu.edu

And importantly, by clicking the "Next" button, you are telling the researcher YES, that you agree to participate in this study.

APPENDIX B**PROTECTIVE BEHAVIORAL STRATEGIES MEASURE****Protective Behavioral Strategy Survey**

Participants will use the following response scale:

{Choose one}

- 1 "Never"
- 2 "Rarely"
- 3 "Occasionally"
- 4 "Sometimes"
- 5 "Usually"
- 6 "Always"

Indicate the degree to which you engaged in the following behaviors during the past month (i.e., past 30 days) when using alcohol or 'partying.'

1. Determine not to exceed a set number of drinks.
2. Alternate alcoholic and nonalcoholic drinks.
3. Have a friend let you know when you've had enough.
4. Leave the bar/party at a predetermined time.
5. Stop drinking at a predetermined time.
6. Drink water while drinking alcohol.
7. Put extra ice in your drink.
8. Avoid drinking games.
9. Drink shots of liquor. (Reverse coded)
10. Avoid mixing different types of alcohol.
11. Drink slowly, rather than gulp or chug.
12. Avoid trying to "keep up" or out-drink others.
13. Use a designated driver.
14. Make sure that you go home with a friend.
15. Know where your drink has been at all times.

APPENDIX C

ALCOHOL CONSUMPTION MEASURE

Daily Drinking Questionnaire

Participants use the following response scale:

{Enter text answer}

Think about your drinking behaviors during the last month (i.e., past 30 days) for the following questions. With respect to alcohol consumption, 1 standard drink is equivalent to 12 oz beer OR 5 oz wine OR 1.5 oz shot of liquor straight or in a mixed drink.

We ask you to fill in the following grid with the typical and heaviest number of standard drinks you consume each day of the week. Enter a '0' to indicate days on which you do not drink.

Personal Alcohol Use

How many standard drinks did you consume each day during a TYPICAL week during the past month? - Monday

How many standard drinks did you consume each day during a TYPICAL week during the past month? - Tuesday

How many standard drinks did you consume each day during a TYPICAL week during the past month? -Wednesday

How many standard drinks did you consume each day during a TYPICAL week during the past month? - Thursday

How many standard drinks did you consume each day during a TYPICAL week during the past month? - Friday

How many standard drinks did you consume each day during a TYPICAL week during the past month? - Saturday

How many standard drinks did you consume each day during a TYPICAL week during the past month? - Sunday

APPENDIX D

ALCOHOL-RELATED PROBLEMS MEASURE

Brief-Young Adult Alcohol Consequences Questionnaire

Please indicate if you experienced any of the following problems within the past month (i.e., past 30 days).

Participants use the following response scale

{Choose all that apply}

() Yes

1. While drinking, I have said or done embarrassing things.
2. I have had a hangover (headache, sick stomach) the morning after I had been drinking.
3. I have felt very sick to my stomach or thrown up after drinking.
4. I often have ended up drinking on nights when I had planned not to drink.
5. I have taken foolish risks when I have been drinking.
6. I have passed out from drinking.
7. I have found that I needed larger amounts of alcohol to feel any effect, or that I could no longer get high or drunk on the amount that used to get me high or drunk.
8. When drinking, I have done impulsive things that I regretted later.
9. I've not been able to remember large stretches of time while drinking heavily.
10. I have driven a car when I knew I had too much to drink to drive safely.
11. I have not gone to work or missed classes at school because of drinking, a hangover, or illness caused by drinking.
12. My drinking has gotten me into sexual situations I later regretted.
13. I have become very rude, obnoxious or insulting after drinking.
14. I have often found it difficult to limit how much I drink.
15. I have woken up in an unexpected place after heavy drinking.
16. I have felt badly about myself because of my drinking.
17. I have had less energy or felt tired because of my drinking.
18. The quality of my work or schoolwork has suffered because of my drinking.
19. I have spent too much time drinking.
20. I have neglected my obligations to family, work, or school because of drinking.
21. My drinking has created problems between myself and my boyfriend/girlfriend/spouse, parents, or other near relatives.
22. I have been overweight because of drinking.
23. My physical appearance has been harmed by my drinking.
24. I have felt like I needed a drink after I'd gotten up (that is, before breakfast).

CURRICULUM VITAE

Benjamin A. Kite

Education:

- | | |
|--------------------------------|---|
| M.S. May 2013
(anticipated) | Old Dominion University
Major: Experimental Psychology
Concentration: Quantitative Psychology
Advisor: James M. Henson, Ph.D.
Thesis: Protective behavioral strategy subtypes as moderators of the relationship between alcohol consumption and alcohol-related problems. |
| B.S. May 2011 | Old Dominion University
Major: Psychology (Departmental Honors)
Minor: Criminal Justice
Honor's Thesis: Self-control, protective behavioral strategies, and alcohol-related problems among college student drinkers. |

Awards and Honors:

- Travel award supported by NIAAA and NIDA (R13AA017107) for up to \$750 for participation in the Early Career Poster Session and Social Hour at the 2012 APA Convention in Orlando, Florida.
- Alan Chaikin Memorial Award for outstanding undergraduate honor's thesis in psychology for the 2010-2011 academic year. \$200.

Peer-Reviewed Publications:

- Pearson, M. R., **Kite, B. A.**, & Henson, J. M. (2013). Unique direct and indirect effects of impulsivity on alcohol-related outcomes via protective behavioral strategies. *Journal of Drug Education*.
- **Kite, B. A.**, Pearson, M. R., & Henson, J. M. (2013). The assessment of protective behavioral strategies: Comparing absolute frequency and contingent frequency response scales. *Psychology of Addictive Behaviors*.
- Pearson, M. R., **Kite, B. A.**, & Henson, J. M. (2012). Predictive effects of good self-control and poor regulation on alcohol-related problems: Do protective behavioral strategies mediate? *Psychology of Addictive Behaviors*. doi: 10.1037/a0028818
- Pearson, M. R., **Kite, B. A.**, & Henson, J. M. (2012). The assessment of protective behavioral strategies: Comparing prediction and factor structures across measures. *Psychology of Addictive Behaviors*, 26(3), 573-584. doi: 10.1037/a0028187