An Examination of the Relationships Between Social Anxiety Dimensions and Alcohol-Related Outcomes: The Mediating Role of Drinking Context

Margo Cooley Villarosa
University of Southern Mississippi
AN EXAMINATION OF THE RELATIONSHIPS BETWEEN SOCIAL
ANXIETY DIMENSIONS AND ALCOHOL-RELATED OUTCOMES:
THE MEDIATING ROLE OF DRINKING CONTEXT

by

Margo Cooley Villarosa

A Dissertation
Submitted to the Graduate School
and the Department of Psychology
at The University of Southern Mississippi
in Partial Fulfillment of the Requirements
for the Degree of Doctor of Philosophy

Approved:

________________________
Dr. Michael B. Madson, Committee Chair
Associate Professor, Psychology

________________________
Dr. Bonnie C. Nicholson, Committee Member
Associate Professor, Psychology

________________________
Dr. Richard S. Mohn, Committee Member
Associate Professor, Educational Studies and Research

________________________
Dr. Virgil Zeigler-Hill, Committee Member
Associate Professor, Psychology

________________________
Dr. Karen S. Coats
Dean of the Graduate School

August 2017
ABSTRACT

AN EXAMINATION OF THE RELATIONSHIPS BETWEEN SOCIAL ANXIETY DIMENSIONS AND ALCOHOL-RELATED OUTCOMES:
THE MEDIATING ROLE OF DRINKING CONTEXT

by Margo Cooley Villarosa

August 2017

The problematic drinking patterns of the college student population have elicited a campus-wide initiative to promote effective prevention and intervention efforts to reduce the range of associated academic, physical, and psychosocial consequences. Identifying those college students at greater risk for developing an alcohol use disorder informs student life personnel of the ways to tailor efforts to ensure effective, healthy changes. Students with social anxiety pose a particular risk for developing problematic drinking patterns because of their heightened focus on how they are viewed by others in social situations coupled with drinking being viewed as a normative behavior. Because these students’ anxiety increases in social situations, utilizing a biopsychosocial framework that examines the role of drinking contexts in the relationship between social anxiety and problematic drinking patterns will shed light on effective prevention and intervention efforts for this subgroup of college students. Further, consideration of the cognitive and behavioral dimensions of social anxiety in relation to both problematic and safe drinking behaviors will provide a broader conceptualization of these students drinking experiences. The current study examined the mediating role of three drinking contexts on the relationship between three dimensions of social anxiety and six alcohol-related outcomes (three problematic and three safe drinking behaviors). Data were
collected from 678 traditional-age college students from a mid-size university in the Southeastern region of the United States. As predicted, evaluation fears-related social anxiety predicted more alcohol consumption, hazardous drinking, and alcohol-related negative consequences, and less controlled consumption and serious harm reduction protective behavioral strategies. Further, negative coping drinking contexts partially mediated each of these relationships. Contrary to predictions, no significant direct or indirect effects were found between performance- and interaction-related social anxiety and alcohol-related outcomes. Further, no gender or racial differences were found in the predicted model. Overall, it appears that the cognitive vulnerabilities of students with social anxiety are more predictive of problematic drinking patterns. In line with the biopsychosocial model, it appears that these students are engaging in problematic drinking behaviors to cope with their symptoms. Important implications for prevention and intervention efforts, as well as directions for future research are outlined below.
ACKNOWLEDGMENTS

I want to recognize a number of individuals who have assisted throughout the development, implementation, and completion of my dissertation project.

First, I want to express my appreciation to my dissertation committee for their support and guidance throughout my dissertation project:

Michael Madson, Ph.D. (committee chair and major professor) provided multiple consultations throughout my tenure as a doctoral student on generating my program of research surrounding social anxiety and alcohol use disorders among college students. Dr. Madson assisted with the idea generation, study implementation, and review of my dissertation manuscript.

Richard Mohn, Ph.D. assisted with my statistical analyses, and provided guidance on writing the planned analyses and results section of my dissertation project. Dr. Mohn also reviewed my final dissertation manuscript.

Bonnie Nicholson, Ph.D. assisted with my conceptualization and implications of my dissertation project. Dr. Nicholson also reviewed my final dissertation manuscript.

Virgil Zeigler-Hill, Ph.D. assisted with the conceptualization of my dissertation project. Dr. Zeigler-Hill also reviewed my final dissertation manuscript.

Second, I want to thank the members of my research team for their support, input, and review of my dissertation project.
TABLE OF CONTENTS

ABSTRACT ........................................................................................................................................ ii

ACKNOWLEDGMENTS ........................................................................................................ iv

LIST OF TABLES .................................................................................................................. viii

LIST OF ILLUSTRATIONS .................................................................................................. ix

CHAPTER I - INTRODUCTION ................................................................................................. 1

Drinking Patterns among College Students ........................................................................ 2

Protective Behavioral Strategies ............................................................................................. 3

Social Anxiety: A Biopsychosocial Perspective ...................................................................... 8

Social Anxiety and Problematic Drinking Patterns ................................................................. 11

Social Anxiety and Safe Drinking Behaviors .......................................................................... 16

Drinking Context .................................................................................................................... 18

Present Study ........................................................................................................................... 23

Question 1 .................................................................................................................................... 25

Question 2 .................................................................................................................................... 26

Question 3 .................................................................................................................................... 27

CHAPTER II – METHODOLOGY ............................................................................................... 28

Participants and Procedures ...................................................................................................... 28

Measures ..................................................................................................................................... 29

Demographic Questionnaire .................................................................................................. 29
Social Anxiety.................................................................................................................. 29

Social Interaction Anxiety Scale (SIAS) and Social Phobia Scale (SPS). ........... 30

Brief Fear of Negative Evaluation (BFNE)................................................................. 31

Negative Drinking Patterns.......................................................................................... 32

Daily Drinking Questionnaire (DDQ). ........................................................................ 32

Alcohol Use Disorders Identification Test (AUDIT). ............................................... 32

Rutgers Alcohol Problem Index (RAPI)....................................................................... 32

Safe Drinking Behaviors.............................................................................................. 33

Protective Behavioral Strategies Scale-revised (PBSS-r)... ........................................ 33

Strategies Questionnaire (SQ)..................................................................................... 34

Drinking Context ......................................................................................................... 35

Drinking Context Scale (DCS). .................................................................................. 35

Data Analytic Approach .............................................................................................. 36

CHAPTER III - RESULTS ............................................................................................ 40

Structural Equation Model.......................................................................................... 42

Global fit statistics. ....................................................................................................... 42

Social anxiety, drinking context, and alcohol consumption. ..................................... 49

Social anxiety, drinking context, and hazardous drinking. ........................................ 49

Social anxiety, drinking context, and negative consequences. .................................. 50

Social anxiety, drinking context, and controlled consumption PBS....................... 51
Social anxiety, drinking context, and serious harm reduction PBS. .......................... 52
Social anxiety, drinking context, and alternatives to drinking.............................. 53
Multigroup Invariance Testing ............................................................................. 53
Model fit and invariance statistics. ...................................................................... 53
Male and female multigroup analyses. ................................................................. 56
White and Black multigroup analyses. ................................................................. 59
CHAPTER IV – DISCUSSION .................................................................................. 61
REFERENCES ......................................................................................................... 77
LIST OF TABLES

Table 1 Means, Standard Deviations, and Intercorrelations of Measures .................. 41

Table 2 Correlation Coefficients for the Three Social Anxiety Dimensions, Three Drinking Contexts, and Six Alcohol-related Outcomes .......................................................... 44

Table 3 Total, Direct, and Indirect Effects of Social Anxiety Dimensions on Alcohol-related Outcomes ........................................................................................................................................................................ 48

Table 4 Multigroup Analyses of the Multiple Mediation Model (Males and Females) ... 58

Table 5 Multigroup Analyses of the Multiple Mediation Model with Alcohol Consumption Constrained (Males and Females) ................................................................. 59

Table 6 Multigroup Analyses of the Multiple Mediation Model (Whites and Blacks) .... 60
LIST OF ILLUSTRATIONS

Figure 1. Predicted Multiple Mediation Model................................................................. 43

Figure 2. Observed Multiple Mediation Model................................................................. 47
CHAPTER I - INTRODUCTION

College student drinking patterns have generated a widespread public health concern, mainly due to the heavy episodic drinking (HED) and subsequent alcohol-related negative consequences (National Institute on Alcohol Abuse and Alcoholism [NIAAA], 2013). Researchers are addressing this concern by identifying and promoting evidence-based safe drinking practices among college student populations. Protective behavioral strategies (PBS) are one such group of safe drinking behaviors that researchers have found to be effective in reducing heavy drinking and subsequent consequences experienced by college students (Pearson, 2013). However, researchers are examining various risk factors, such as social anxiety symptoms, that place certain students at greater risk for developing problematic drinking patterns and less frequent use of PBS when drinking. Specifically, students with social anxiety symptoms tend to have poorer outcomes from a brief alcohol intervention that emphasized PBS use, likely due to the cognitive, behavioral, and emotional vulnerabilities common among this subgroup (Terlecki, Buckner, Larimer, & Copeland, 2011). Further, these vulnerabilities typically lead students to resort to hazardous drinking and subsequent consequences as a means of managing their symptoms. Thus, considering the social atmosphere of college campuses are conducive to drinking, it is important to examine the role of various drinking situations to better understand the relationship between social anxiety symptoms and problematic drinking patterns. Using the biopsychosocial model (Buckner, Heimberg, Ecker, & Vinci, 2013) as the overarching framework, the purpose of the current study was to examine the relationships among three dimensions of social anxiety, problematic and safe drinking behaviors, and drinking context in a sample of college student drinkers.
Drinking Patterns among College Students

College student drinking patterns have been a source of serious concern among public health officials, school administrators, and mental health professionals due to the alarming rates of subsequent alcohol-related negative consequences (Johnston, O’Malley, Bachman, Schulenberg, & Miech, 2014). In particular, roughly 80% of college students in the United States have consumed alcohol in the past month, with nearly 50% of these students engaging in heavy episodic drinking (HED; 4/5 or more alcohol beverages consumed in one sitting within a two-hour period for females/males; NIAAA, 2013). With the increasing rates of heavy episodic drinking, researchers have examined a range of alcohol-related negative consequences that have impacted academic, social, and emotional functioning among college students (e.g., missed classes, physical altercations, death; Mallett et al., 2012). Specifically, college student drinking has been associated with approximately 600,000 unintentional injuries, 97,000 sexual assaults, and 2,000 deaths annually (NIAAA, 2013). Based on the higher rates of heavy drinking among college students (35%) compared to their non-college peers (31%; Johnston et al., 2014) and college students increased likelihood of developing an alcohol use disorder (Slutske, 2005), it is important to consider the dispositional and situational risk factors of college student drinkers.

Researchers have examined the trends in alcohol consumption among various dispositional characteristics of college students to aid in determining those at greater risk for problematic drinking across college campuses. In terms of gender differences among college student drinkers, the gap has been narrowing since 2004, with males reporting a decline in daily drinking (roughly 6%) and HED (49%) and females reporting an increase
in daily drinking (roughly 5%) and HED (34%; Johnston et al., 2014). In regards to racial differences, White college students engage in more HED (45%) compared to Black college students (15%), which has been a consistent trend since 1980 (O’Malley & Johnston, 2002). While many college students report that their heavy drinking decreases post-graduation (O’Malley, 2004), approximately 19% of college students will meet criteria for an alcohol use disorder during their college career (NIAAA, 2013), which heightens their risk for acute as well as continued alcohol-related negative consequences in the future. Thus, researchers are identifying safe drinking practices to aid prevention and intervention efforts aimed at reducing these students risk for engaging in problematic drinking patterns (i.e., increased alcohol consumption, hazardous drinking, and alcohol-related negative consequences) and developing an alcohol use disorder. One such set of safe drinking practice that has received extensive attention over the past two decades are protective behavioral strategies.

Protective Behavioral Strategies

When considering safe drinking practices among college students, there is mounting evidence for the benefits of using protective behavioral strategies. Protective behavioral strategies are defined as self-regulatory strategies used prior to or while drinking to reduce the potential for harm (Martens et al., 2005; Martens, Martin, Littlefield, Murphy, & Cimini, 2011). College students who report more PBS use also report experiencing less problematic drinking (i.e., less alcohol consumption and hazardous drinking and fewer alcohol-related negative consequences; Borden, Martens, McBride, Sheline, Bloch, & Dude, 2011; Madson, Arnau, & Lambert, 2013). Further, three brief alcohol intervention studies have identified PBS use as an effective safe
drinking practice to reduce heavy drinking and alcohol-related negative consequences among college drinkers (Barnett, Murphy, Colby, & Monti, 2007; Larimer et al., 2007; Murphy et al., 2012). Thus, utilization of PBS may be effective in ensuring responsible drinking patterns among college students.

In addition to the direct inverse relationships PBS has with problematic drinking patterns, PBS use has been identified as a mediator and moderator in the associations that a variety of alcohol-related and psychosocial variables (e.g., drinking motives, mental health symptoms, normative perceptions, alcohol expectancies) have with alcohol-related outcomes (Borden et al., 2011; D’Lima, Pearson, & Kelley, 2012; Kenny & LaBrie, 2013; Madson, Moorer, Zeigler-Hill, Bonnell, & Villarosa, 2013; Martens, 2007; Martens et al., 2008). For example, Pearson, Kite, and Henson (2013) found that PBS mediated the association between that age of drinking onset and alcohol consumption and subsequent alcohol-related negative consequences, whereas Benton and colleagues (2004) found PBS moderated the association between alcohol consumption and alcohol-related negative consequences. Further, D’Lima and colleagues (2012) found mediating and moderating effects of PBS use in the relationship between self-regulation and alcohol-related negative consequences. Specifically, D’Lima et al. (2012) found that PBS use explained the inverse relationship between self-regulation and alcohol-related negative consequences, and they found a stronger relationship between PBS and alcohol-related negative consequences among students with low self-regulation as compared to those with high self-regulation. Overall, the range of factors that contribute to college student drinking behaviors reveals the importance of PBS use as a safe drinking practice.
While researchers have identified the predictive, mediating, and moderating
effects of PBS as a safe drinking practice in reducing problematic drinking patterns, it is
also important to consider the antecedents of PBS use, particularly among at-risk
subgroups such as college students. For example, college men and college students with
a problem-drinking parent have been found to use fewer PBS (Walters, Roudsari, Vader,
& Harris, 2007), whereas no differences in PBS use have been found across racial groups
(Lawrence, Abel, & Hall, 2010). Further, Lewis, Rees, and Lee (2009) examined
normative perceptions of PBS use and found students with higher normative perceptions
also reported more personal PBS use. By identifying the factors that predict safer
drinking among college students, prevention and intervention efforts can be tailored to
identify and incorporate both protective and risk factors into discussions around PBS use.
Further, Pearson (2013) described the importance of deconstructing PBS into their
specific types to better clarify the factors that predict college students’ use of different
types of PBS. Thus, although certain dispositional and psychosocial factors have been
found to predict overall PBS use, it is important to determine if these relationships
change when examining certain types of PBS college students use to stay safe while
drinking.

Although overall PBS use has been associated with less alcohol consumption and
fewer alcohol-related negative consequences, researchers have also examined how
different types of PBS are related to different alcohol-related outcomes. Martens and
colleagues (2005) originally categorized PBS into three types: manner of drinking
(MOD; e.g., drink slowly, rather than gulp or chug), limiting/stopping drinking (LSD;
e.g., determine not to exceed a set number of drinks), and serious harm reduction (SHR;
e.g., use a designated driver; Martens et al., 2005). Overall, each of these PBS types were inversely related to alcohol consumption and alcohol-related negative consequences (Martens, Pedersen, LaBrie, Ferrier, & Cimini, 2007); however, longitudinal analyses revealed that students using more MOD report less alcohol consumption, those using more SHR report fewer alcohol-related negative consequences, and SDL strategies do not maintain a relationship with either alcohol-related outcome after a 12-month period (Martens et al., 2011). Further, the SHR strategies entailed reliability errors that warranted measurement modification. Considering the aforementioned concerns, other researchers have taken steps to expand on Martens and colleagues (2005) original PBS measure to 1) combine the MOD and SDL drinking strategies to describe strategies that are directly related to the way students drink alcohol and 2) improve the reliability of SHR drinking strategies by adding more items, which describe strategies more focused on the preparations students make to reduce harm during social drinking events (DeMartini et al., 2013; Madson, Arnau, et al., 2013).

PBS have more recently been categorized into two types: direct/controlled consumption strategies (CC; e.g., refusing to participate in drinking games) and indirect/serious harm reduction strategies (SHR; e.g., leaving the bar with a friend) strategies (DeMartini et al., 2013; Madson, Arnau, et al., 2013; Pearson, 2013). Recently, DeMartini and colleagues (2013) found that direct strategies are more strongly associated with less alcohol consumption, whereas indirect strategies are more strongly associated with fewer alcohol-related negative consequences. In addition to understanding the direct and indirect PBS commonly employed by college students, researchers have incorporated safe strategies that involve avoiding alcohol consumption to better determine additional
ways students keep themselves safe in drinking situations. Sugarman and Carey (2007) developed a survey of protective strategies that captured three categories. Two of the categories are consistent with those found in other well-established measures (e.g., DeMartini et al., 2012; Madson, Arnau, et al., 2013), but their third category Alternatives to Drinking (ATD) entails strategies that students can use without alcohol involved (e.g., practicing ways to be more comfortable in social settings without using alcohol; Sugarman & Carey, 2007). While relatively new to the college drinking literature, Pearson et al (2013) found that overall, ATD strategies were negatively related to alcohol-related outcomes, but Linden, Kite, Braitman, and Henson (2014) found that students drinking for negatively reinforcing drinking motives (e.g., coping motives) were less likely to use these strategies and subsequently report more alcohol-related negative consequences. This research is important because coping drinking motives are commonly endorsed among college students experiencing negative internal states, such as psychological distress or low self-esteem, which has been related to engaging in more problematic and fewer safe drinking behaviors (Kenny & LaBrie, 2013; Zeigler-Hill, Stubbs, & Madson, 2013).

Based on the differential relationships the types of PBS have with the problematic drinking behaviors, it is important to include PBS use as a safe drinking behavior in the broader conceptualization of college student drinking patterns to better inform prevention and intervention efforts on effective strategies to manage problematic drinking patterns. Further, based on the role that negative internal states may have on the utilization of certain PBS, it is important to consider how mental health symptoms, such as social anxiety symptoms, predict the problematic (i.e., alcohol consumption, harmful drinking,
and alcohol-related negative consequences) and safe (i.e., controlled consumption, serious harm reduction, and alternatives to drinking PBS) drinking patterns of college students.

Social Anxiety: A Biopsychosocial Perspective

One such population at risk for engaging in more problematic drinking and developing an alcohol use disorder (AUD) are individuals with social anxiety disorder (SAD), or social phobia (Buckner et al., 2013; Grant et al., 2004). Persons with social anxiety are characterized as experiencing psychological distress and physiological symptoms in social situations due to an excessive fear of negative evaluation by others (Kashdan & Steger, 2006). Further, the extent of cognitive, physiological, and emotional fears typically lead individuals presenting with even subclinical symptoms of social anxiety to engage in perceived peer-approving behaviors (e.g., alcohol consumption among college students) to avoid scrutiny or social situations altogether (Stewart, Morris, Mellings, & Komar, 2006). In terms of lifetime prevalence rates, roughly 11% of males and 15% of females have been diagnosed with SAD, placing it at the fourth most prevalent mental disorder behind substance use disorder, depression, and specific phobias (Kessler et al., 2005; Morris, Stewart, & Ham, 2005). Asnaani, Richey, Dimaite, Hinton, and Hofmann (2010) also reported racial differences, noting that approximately 13% of their White sample and 9% of their Black sample were diagnosed with SAD.

Regarding the comorbidity between SAD and AUD, approximately 48% of individuals with SAD also meet criteria for an AUD (Buckner et al., 2013). For persons not seeking treatment, Kessler and colleagues (1997) found 11% of males and 24% of females met criteria for SAD and AUD, and these rates increased to 19% and 30%,
respectively, when examining lifetime comorbidity. Researchers have found that SAD predates an AUD diagnosis. For example, Buckner, Timpano, Zvolensky, Sachs-Ericsson, and Schmidt (2008) found that roughly 80% of participants reported their SAD predated their AUD. Unfortunately, comorbidity rates across racial groups have not been reported, and warrant examination considering the prevalence of SAD among African Americans (Asnaani et al., 2010).

Among college students, Blanco and colleagues (2008) found that roughly 3% of college students meet criteria for SAD. Further, Kushner and Sher (1993) found that 43% of their college sample who met criteria for SAD also met criteria for an AUD. In addition to examining individuals who meet criteria for SAD, researchers are also examining the relationship between persons with subclinical social anxiety symptoms and their problematic drinking patterns (e.g., Buckner & Matthews, 2012; Ham, 2009; Norberg, Norton, Olivier, & Zvolensky, 2010). For example, Crum and Pratt (2001) found that over 13 years, persons presenting with subclinical symptoms of social anxiety were at greater risk for developing an AUD compared to those with no social anxiety symptoms. Considering the social drinking atmosphere across college campuses combined with the psychological vulnerability of students presenting with social anxiety symptoms, it may be that alcohol serves as a buffer for these students to become more involved in social situations. Consequently, alleviating their social anxiety symptoms through self-medicating with alcohol may also be a precursor to developing an AUD (Carrigan & Randall, 2003). Thus, it is important to examine the theoretical rationale linking social anxiety symptoms with alcohol use disorder to inform prevention and intervention efforts of methods to help these students alleviate their anxiety symptoms.
with coping strategies that will allow them to continue to be involved with their peers without engaging in problematic drinking patterns.

Various theories regarding the connection between social anxiety disorder and alcohol use disorders have been suggested (Buckner et al., 2013; Carrigan & Randall, 2003). Buckner and colleagues (2013) proposed a biopsychosocial model of the social anxiety-substance use relationship, identifying five potential dimensions of social anxiety, including (a) physiological arousal, (b) evaluation fears, (c) low positive affect, (d) perceived social deficits, and (e) social avoidance. Further, they integrate the self-medication hypothesis (i.e., resorting to alcohol use to manage psychological symptoms; Carrigan & Randall, 2003) in their model to explain the SAD-AUD link. Researchers have expanded on the self-medication hypothesis by noting that persons with social anxiety may be consuming alcohol to 1) alleviate negative symptoms, 2) increase their positive affect, and/or 3) avoid negative evaluation, highlighting that these students may be self-medicating with alcohol or other substances based on different social anxiety dimensions (Carrigan & Randall, 2003).

Similar to Carrigan and Randall’s (2003) self-medication hypothesis, Bacon and Ham (2010) proposed the Avoidance-Coping Cognitive Model to explain the SAD-AUD link, highlighting that attentional biases to social threat among persons with social anxiety are reduced through the anxiolytic (i.e., anxiety relieving) effects of alcohol consumption. These researchers also expand on the self-medication hypothesis by noting the heightened cognitive vulnerabilities and physiological arousal that perpetuate social anxiety symptoms in social situations are directly reduced from the stress-reducing effects of alcohol, which then perpetuates the use of alcohol in subsequent social settings.
Taken together, previous researchers have identified major behavioral, emotional, and physiological components that foster drinking to cope with symptoms of social anxiety. Additionally, researchers have addressed a major cognitive component wherein increased attention of potential negative evaluation from others is alleviated through the anxiolytic effects of alcohol consumption (Bacon & Ham, 2010; Buckner et al., 2013). Although these models are slightly different, there is consistency in 1) incorporating the self-medication hypothesis into their theoretical conceptualization of the link between SAD and AUD and 2) defining social anxiety multi-dimensionally. Thus, further examination is needed to understand the complex relationship between the multidimensionality of social anxiety and problematic drinking patterns among college students. Also, determining how this theoretical conceptualization translates to students presenting with subclinical social anxiety and drinking patterns will better inform prevention and intervention efforts on how to reduce their risk of experiencing severe alcohol-related problems and developing an AUD.

Social Anxiety and Problematic Drinking Patterns

Overall, there appears to be a positive relationship between social anxiety symptoms and alcohol-related negative consequences among college students (Morris et al., 2005; Schry & White, 2013); however, there have been inconsistent findings regarding the relationship between social anxiety symptoms and alcohol consumption (i.e., quantity and frequency), with most researchers reporting no relationship (Buckner & Heimberg, 2010; Buckner, Schmidt, & Eggleston, 2006; Gillies, Turk, & Fresco, 2006; Ham, Zamboanga, Bacon, & Garcia, 2009; Lewis et al., 2008; Schry & White, 2013; Stewart et al., 2006). To clarify the connection that social anxiety symptoms have with
alcohol consumption, it is important to consider the hazardous drinking patterns among this subgroup. One facet of hazardous drinking that is commonly missed when assessing alcohol consumption, via weekly quantity and frequency, and alcohol-related negative consequences are questions related to developing alcohol dependency, and thus identifying persons who are more likely to develop an AUD. Similar to the social anxiety-alcohol consumption relationship, findings provided thus far suggest that social anxiety symptoms are either positively related (Grant et al., 2004; Villarosa, Madson, Zeigler-Hill, Noble, & Mohn, 2014) or unrelated (Ham, Zamboanga, & Bacon, 2011; Ham et al., 2009) to hazardous drinking.

In addition to the differing relationships found between social anxiety symptoms and various drinking-related outcomes, there have also been mixed findings regarding demographic differences in the social anxiety-drinking outcomes relationships (Norberg, Norton, & Olivier, 2009; Norberg, Olivier, Alperstein, Zvolensky, & Norton, 2011; Villarosa, Madson, et al., 2014). For example, Norberg and colleagues (2010) found that females with elevated social anxiety symptoms reported more alcohol-related negative consequences, which they attributed to their tendency to drink to cope with negative affect. In contrast, Lewis and colleagues (2008) found no gender differences in the relationship social anxiety has with alcohol consumption or alcohol-related negative consequences. Although the research is building on the role of gender in the social anxiety-drinking outcomes relationships, there is no research examining racial differences. Recently, Johnson and Anderson (2014) found no differences in evaluation fears among Black and White college students; however, it is important to consider these differences in relation to drinking behaviors. Overall, females report more social anxiety
symptoms, White college students and males engage in more problematic drinking patterns, and there is a lack of research examining racial differences across social anxiety symptoms. Thus, it is important to inform prevention and intervention efforts as to the manner in which social anxiety symptoms and drinking behaviors are related across gender and race to tailor treatment approaches accordingly.

While the literature is building on the relationships between social anxiety symptoms and problematic drinking patterns (i.e., alcohol consumption, hazardous drinking, and negative alcohol-related consequences), it is important to consider the multidimensionality of social anxiety and how different symptoms may foster different drinking behavior outcomes. Across the college student literature, three social anxiety dimensions -- social avoidance, psychological distress, and interaction anxiety -- have been commonly used to determine one’s degree of social anxiety symptoms (e.g., Ham, Bonin, & Hope, 2007; Ham & Hope, 2006; Lewis et al., 2008). Although some measures have generated confidence in identifying persons who may meet criteria for social anxiety disorder, the range of measures used to assess social anxiety may explain the differing relationships found between college students with elevated social anxiety symptoms and problematic drinking patterns. Mattick and Clarke’s (1998) companion measures, the Social Phobia Scale (SPS) and the Social Interaction Anxiety Scale (SIAS), are the most commonly used to assess social anxiety in college students. These measures examine the distress and fear experienced when performing routine behaviors in public (i.e., SPS), as well as, when interacting with others (i.e., SIAS). Consistently, students reporting more social anxiety symptoms from these measures are also reporting more alcohol-related negative consequences (e.g., Buckner, Ecker, & Proctor, 2011; Buckner
& Matthews, 2012; Terlecki, Ecker, & Buckner, 2014); however, results have been inconsistent regarding the relationship social anxiety symptoms have with alcohol consumption and hazardous drinking, with most researchers finding social anxiety to be inversely related (e.g., Schry & White, 2013) or unrelated (e.g., Gillies et al., 2006) to alcohol consumption. Further, some researchers have found a positive relationship between social anxiety and hazardous drinking (e.g., Villarosa, Madson, et al., 2014); whereas most have found social anxiety to be inversely (e.g., Ham, 2009) or unrelated (e.g., Ham et al., 2011) to hazardous drinking.

While Mattick and Clarke (1998) developed their measures following the criteria outlined in the DSM-III, they noted that the lack of assessment of the maladaptive cognitions (i.e., fear of negative evaluation) common among socially anxious persons is problematic because those evaluation fears are predictive of scores on their two measures and may even mediate the relationship that these measures have with general anxiety. Thus, fear of negative evaluation appears to be a cornerstone of the social anxiety construct, and warrants inclusion in the operational definition of social anxiety. To date, only two studies have investigated social anxiety based on social fears, interaction anxiety, and fear of negative evaluation (Norberg et al., 2009; Norberg et al., 2011). However, these researchers used participants’ scores on each of the three measures to categorize students into a high versus low social anxiety group. Although utilizing three measures of social anxiety increases confidence in identifying individuals who meet the clinical cutoff for social anxiety disorder, only a few researchers have examined whether these measures differ in their relationships with different drinking-related outcomes (Morris et al., 2005; Stewart et al., 2006). For example, Stewart and colleagues (2006)
found the social avoidance and distress dimension of social anxiety were negatively related to drinking frequency, whereas the evaluation fears dimension was positively related to negative alcohol-related consequences. Overall, most dimensions of social anxiety support the positive relationship between social anxiety symptoms and negative alcohol-related consequences. Due to the limited research on the negative evaluation of fears dimension of social anxiety, combined with the inconsistent associations social anxiety symptoms have with alcohol consumption and hazardous drinking, more research is needed to determine if the dimensions of social anxiety are differentially related to alcohol-related outcomes.

In addition to considering the direct relationships that different dimensions of social anxiety symptoms have with various drinking outcomes, it is important to identify other drinking-related or psychosocial variables that may explain the differing relationships social anxiety symptoms have with drinking-related outcomes. Researchers have identified a range of internal (e.g., drinking motives; Ham et al., 2009) and external (perceived norms; Buckner et al., 2011) drinking-related variables that may explain the problematic drinking patterns of students with elevated social anxiety symptoms. For example, Lewis and colleagues (2008) found that students reporting more social anxiety symptoms who were drinking to alleviate negative affect (i.e., coping motives) or to avoid negative evaluation (i.e., conformity motives) were reporting more alcohol-related negative consequences. Additionally, students with more social anxiety symptoms, who held more positive social expectancies of alcohol use reported engaging in more hazardous drinking, which contradicts other research findings that suggest a negative direct relationship between social anxiety symptoms and hazardous drinking (Ham et al,
As the research is building on the direct and indirect relationships that various alcohol-related and psychosocial factors have on the social anxiety-problematic drinking patterns relationships, it is important to examine the safe drinking patterns of students with social anxiety symptoms to gain a clearer understanding of the overall drinking patterns common among this subgroup.

Social Anxiety and Safe Drinking Behaviors

There is limited research on the relationship between social anxiety and PBS use; however, researchers have begun to examine the relationships between negative affect, PBS use and problematic drinking patterns (i.e., alcohol consumption, hazardous drinking, and alcohol-related negative consequences). For example, Martens and colleagues (2008) found PBS use mediated the association between depressive symptoms and alcohol-related negative consequences, such that students with elevated depressive symptoms reporting fewer PBS use also reported more negative consequences. Further, Kenny and LaBrie (2013) found mental health symptoms (i.e., depression and anxiety) moderated the relationship between PBS use and alcohol-related negative consequences, such that more PBS use was related to fewer alcohol-related negative consequences among participants with more mental health symptoms. Finally, Linden, Lau-Barraco, & Milletich (2013) found PBS use mediated the association between anxiety and alcohol-related negative consequences, such that students with more anxiety who reported fewer PBS use also reported more negative consequences. Taken together, there appears to be a direct inverse relationship between students with more negative affect and their PBS use.

Looking at social anxiety symptoms and PBS use, only one study has explored this direct relationship, and found that students with elevated social anxiety symptoms
reporting fewer PBS use when considered in the context of other drinking-related outcomes (Villarosa, Madson, et al., 2014). Thus, social anxiety symptoms are directly related to PBS use when conceptualizing college student overall drinking patterns (i.e., alcohol consumption, hazardous drinking, alcohol-related negative consequences, and PBS use). Further, enhancement drinking motives (i.e., drink to increase positive affect; Cooper, 1994) mediated the positive relationship between social anxiety symptoms and each problematic drinking outcome (Villarosa, Madson, et al., 2014). Although enhancement motives are categorized as a positive drinking motive, Buckner and colleagues (2006) note that students with elevated social anxiety symptoms may be interpreting enhancement motives as drinking to experience positive affect, rather than to increase positive affect, which is also in line with Buckner and colleagues (2013) biopsychosocial theoretical model linking SAD and AUD (described above, see page 13).

In terms of the types of PBS, Villarosa, Moorer, Madson, Zeigler-Hill, and Noble (2014) found that social anxiety symptoms were inversely related to serious harm reduction (SHR) strategies and unrelated to controlled consumption (CC) strategies such that students with elevated social anxiety symptoms reported using fewer SHR, but not CC strategies. Further, SHR strategies mediated the relationship between social anxiety symptoms and alcohol-related negative consequences such that students with elevated social anxiety symptoms, who reported fewer SHR strategies, also reported more negative consequences. Consistent with DeMartini and colleagues (2013) who found differential relationships between the two types of PBS and alcohol consumption and alcohol-related negative consequences, these researchers found similar relationships in a sample of socially anxious college students. Thus, students with elevated social anxiety
symptoms may benefit from using more SHR, instead of CC strategies to reduce the number of alcohol-related negative consequences. However, no research has examined the relationship between social anxiety symptoms and alternatives to drinking strategies (e.g., Finding other ways besides drinking to reduce stress; Sugarman & Carey, 2007). Considering the college student environment may serve as a catalyst for college students with social anxiety symptoms to potentially develop an Alcohol Use Disorder, or clinically significant social anxiety, it is important to understand if students are already taking safer steps to manage their symptoms by engaging in strategies other than drinking. In addition to understanding the safe drinking patterns among these students, it is beneficial to examine which social situations these students will engage in more problematic and less safe drinking patterns.

Drinking Context

Although a range of drinking-related and psychosocial factors have been examined in the relationships that social anxiety symptoms has with problematic and safe drinking behaviors, more research is needed to determine the role of environmental factors (e.g., drinking context) in the relationship social anxiety symptoms have with college students’ overall drinking patterns (i.e., alcohol consumption, hazardous drinking, negative consequences, SHR strategies, CC strategies, and alternative strategies). With involvement in the social environment being the catalyst for increased emotional, behavioral, physiological, and cognitive symptoms among persons with social anxiety symptoms, and the college atmosphere fostering increased alcohol consumption in a number of social settings, it is important to examine which situations students with social anxiety symptoms are more prone to engage in problematic drinking patterns.
A number of approaches have been taken to examine the role of the environment on college student drinking patterns. Some researchers have examined the difference between social versus solitary drinking (Cullum, O’Grady, Armeli, & Tennen, 2012); whereas others have incorporated cognitive (e.g., social influence) and affective states into their conceptualization of different drinking contexts (O’Hare, 1997; Samoluk, Stewart, Sweet, & MacDonald, 1999). Broadly, it appears that students consume more alcohol in social drinking settings compared to solitary drinking (Cullum et al., 2012); however, research examining drinking context among students sensitive to anxiety suggest different. For example, Samoluk and colleagues (1999) examined alcohol consumption among students with varying levels of anxiety sensitivity after completing a tower-building game in a socially affiliated context—either alone or in a group—and found that students high in anxiety sensitivity consumed more alcohol if they completed the game alone versus those completing the game in a group. Thus, negative internal states and heightened cognitive vulnerabilities may also entice students to consume more alcohol when they are alone.

Since many interactions among college students occur in social drinking situations, examining how the drinking context influences the drinking patterns of students with elevated social anxiety symptoms can shed light on their problematic drinking patterns. When operationalizing various drinking situations, researchers consistently incorporate internal mood states into the various positive and negative drinking situations common among college students (Annis, 1982; O’Hare, 2001). Specifically, O’Hare (2001) developed the Drinking Context Scale (DCS), which is comprised of three drinking contexts (i.e., convivial drinking, personal-intimate drinking,
and negative coping drinking). Importantly, he distinguished from other drinking context measures by examining the contexts in which college students report excessive drinking, as they are less likely to evaluate their drinking as abuse or problematic (as described in Annis, 1982). Convivial drinking (i.e., drinking in social, celebratory contexts) is the most commonly endorsed drinking context among college students. College students also drink in more intimate settings, with romantic partners or persons, where sexual activity is likely to be an outcome (i.e., personal-intimate drinking contexts). Finally, students reporting more psychological distress typically drink in situations that will allow them to cope with their negative emotions (i.e., negative coping drinking contexts).

Overall, college students, especially males, report more alcohol consumption, typically when drinking in convivial drinking contexts, whereas students reporting more alcohol-related negative consequences, especially socio-emotional problems, typically when drinking in negative coping drinking contexts (O’Hare, 2001; O’Hare & Sherrer, 2005). Thus, determining if the relationship between students with elevated social anxiety symptoms and various drinking behaviors depends on or is explained by the drinking context is important for prevention and intervention efforts in reducing future risk for an alcohol use disorder.

Researchers suggest that students reporting more negative affect (e.g., anxiety or depression) are drinking in contexts that allow for tension reduction (Lawyer, Karg, Murphy, & McGlynn, 2002; Ralston & Palfai, 2010). For example, Ralston and Palfai (2010) found that students reporting elevated depressive symptoms were more likely to engage in drinking for emotional relief. Further, solitary drinking, a common negative coping context, is commonly endorsed among college students with depression who
report more negative alcohol-related consequences, and less heavy drinking in social situations compared to students who do not engage in solitary drinking (Gonzalez, Collins, & Bradizza, 2009). Goldsmith, Tran, Smith, and Howe (2009) found that hazardous drinking students who report more general anxiety also endorsed heavier drinking in negative-affect situations than a sample of nonhazardous drinking college students. Goldsmith and colleagues (2009) also noted the mediating effect of drinking to cope, which lends additional support to the self-medication hypothesis for persons presenting with mental health symptoms.

There is emerging research examining the extent to which drinking context mediates and/or moderates the relationship between social anxiety and alcohol-related outcomes. Ham and colleagues (2011) found that alcohol outcome expectancies in convivial drinking contexts moderated the association between social anxiety and hazardous drinking suggesting that the positive association between social anxiety and hazardous drinking was stronger for students who reported higher positive and lower negative expectancies in convivial drinking contexts compared to expectancies in other drinking contexts. More researchers have found mediating effects of drinking contexts in various relationships between mental health symptoms and drinking patterns (Norberg et al., 2010; Terlecki et al., 2014; Terlecki & Buckner, 2015). For example, Terlecki and colleagues (2014) examined the mediating role of drinking context in the relationship between college students categorized as high or low in social anxiety and their problematic drinking patterns. They found that students in the high social anxiety group engaged in heavy drinking in negative coping and personal-intimate drinking contexts, and these two drinking contexts mediated the relationship between social anxiety and
alcohol-related negative consequences. When these drinking contexts were entered simultaneously, only personal-intimate drinking contexts uniquely mediated the social anxiety-negative consequences relationship (Terlecki et al., 2014). Therefore, it appears that interacting with peers, even in smaller settings, is a prerequisite for alcohol consumption that results in more alcohol-related negative consequences.

Although researchers have examined the role of drinking context among socially anxious college students, it is important to examine the role of drinking context when utilizing multiple dimensions of social anxiety and their relation to both negative and safe drinking behaviors. Consistent with the biopsychosocial theory linking social anxiety with alcohol problems (Buckner et al., 2013), researchers have noted differential relationships between dimensions of social anxiety and alcohol-related outcomes based on psychosocial factors (e.g., drinking motives; Buckner et al., 2006) similar to drinking context. Although most researchers who have examined the scrutiny fears and interaction anxiety dimensions of social anxiety found coping and conformity motives to explain the relationship between social anxiety and problematic drinking, Stewart and colleagues (2006) found the evaluation fears dimension of social anxiety to also be related to social motives, suggesting these individuals may need to consume alcohol to interact in social settings. Thus, examining the three different dimensions of social anxiety may expand on current findings (Terlecki et al., 2014) to suggest that convivial drinking contexts may help explain the relationship between the fear of negative evaluation dimension of social anxiety and problematic drinking patterns.

In addition to considering the multidimensionality of social anxiety symptoms, it is important to examine gender and racial differences of college students presenting with
social anxiety symptoms across drinking contexts. O’Hare and Sherrer (2005) found male freshman first-time offenders reported more alcohol consumption in convivial drinking contexts, but not personal-intimate or negative coping, compared to females. Further, Lawyer and colleagues (2002) found the relationship between anxiety sensitivity and negative coping contexts was stronger among males than females, suggesting that males may manage their internal mood states with alcohol, but only in situations that perpetuate their symptoms. Similar to the social anxiety literature, few researchers have examined racial differences across various drinking contexts. Blume, Lovato, Thyken, and Denny (2012) examined the relationship between reported microaggressions, anxiety levels, alcohol consumption, negative consequences, and high-risk situations among a sample of African American college students. They found that students with less confidence in high-risk situations (i.e., “situations in which urges to drink may arise”) engaged in more binge drinking episodes and experienced more alcohol-related negative consequences; however, there was no relationship to reported anxiety symptoms (Blume et al., 2012). Given the brevity of existent research on gender and racial differences among students with symptoms of social anxiety who consume alcohol, more research is needed to explore social anxiety symptoms specifically in relation to various drinking contexts in order to better inform culturally sensitive prevention and intervention efforts.

Present Study

The current study sought to extend the research by Terlecki et al. (2014) and Ham et al. (2011) to examine the mediating role of drinking context in the relationship between three dimensions of social anxiety (i.e., distress and fear performing routine behaviors, distress and fear in social interactions, and fear of negative evaluation) and
problematic (i.e., alcohol consumption, hazardous drinking, and alcohol-related negative consequences) and safe (i.e., controlled consumption PBS, serious harm reduction PBS, and alternatives to drinking strategies) drinking patterns among a sample of college students. Previous researchers have not incorporated safe drinking behaviors into the drinking pattern conceptualization, which is an important first step to ensure 1) proximal behaviors (safe drinking behaviors) that affect problematic drinking behaviors are incorporated, and 2) antecedents for safe drinking behaviors are identified in a sample more prone to experiencing alcohol-related negative consequences and developing an alcohol use disorder. Further, as the first study to examine the relationship between social anxiety symptoms and alternatives to drinking strategies, it will be important to identify those students who are taking healthy steps to manage their internal state, and to tailor prevention and intervention efforts to those students who are neglecting alternative strategies and/or safe drinking behaviors and have resorted to increased problematic drinking.

Following Buckner and colleagues’ (2013) biopsychosocial model of the SAD-AUD link, different dimensions of social anxiety may be differentially related to various drinking-related outcomes. While biological considerations are relevant in the diagnosis of SAD, psychological treatment considerations focus on the role that psychosocial factors (i.e., cognitive and emotional vulnerabilities) play in subsequent anxiety-reducing behaviors (e.g., alcohol consumption) among students with varying levels of social anxiety, and thus warrant the primary focus in the current study. Thus, the current study focused on four of the five major dimensions outlined in their model (i.e., perceived social deficits, social avoidance, physiological arousal, and evaluation fears), as the
companion measures developed by Mattick and Clarke capture the behavioral, cognitive, and physiological reactions individuals have in relation to their scrutiny fears. However, these researchers emphasize the importance of including an evaluation fears measure to better understand the role of evaluation fears in their conceptualization of social anxiety as it relates to problematic drinking patterns.

The purpose of the current study was to examine a path model of three dimensions of social anxiety symptoms and drinking context on the negative (i.e., alcohol consumption, hazardous drinking, and alcohol-related negative consequences) and safe (i.e., CC strategies, SHR strategies, and alternatives to drinking strategies) drinking behaviors in a sample of college students with subclinical social anxiety symptoms to address the following questions:

**Question 1**

To what extent do three dimensions of social anxiety symptoms (i.e., scrutiny fears, interaction fears, and negative evaluation fears) predict negative and safe drinking behaviors?

**Hypothesis 1a.** There will be a direct relationship between social anxiety symptoms, as assessed by the Social Interaction Anxiety Scale (SIAS) & Social Phobia Scale (SPS), and hazardous drinking, alcohol-related negative consequences, SHR strategies, and alternatives to drinking strategies such that students with more social anxiety symptoms will report more hazardous drinking and alcohol-related negative consequences and fewer SHR and alternatives to drinking strategies. Social anxiety symptoms will be unrelated to reported alcohol consumption and CC strategies.
**Hypothesis 1b:** There will be a direct relationship between negative evaluation fears, as assessed by the BFNE, and hazardous drinking, alcohol-related negative consequences, CC strategies, SHR strategies, and alternatives to drinking strategies such that students with more evaluation fears symptoms of social anxiety will report more hazardous drinking and alcohol-related negative consequences and fewer CC, SHR, and alternatives to drinking strategies. Evaluation fears will be unrelated to reported alcohol consumption.

**Question 2**

To what extent does drinking context mediate the relationships each of the three dimensions of social anxiety symptoms have with negative and safe drinking behaviors?

**Hypothesis 2a.** Consistent with Terlecki et al. (2014) and Terlecki and Buckner (2015), the relationship between social anxiety symptoms (as assessed by the SIAS and SPS) and negative and safe drinking behaviors will be partially mediated by drinking context such that students with more social anxiety symptoms who drink in personal-intimate or negative coping drinking contexts will report more negative and fewer safe drinking behaviors. However, due to the lack of research examining the relationship between social anxiety symptoms and alternatives to drinking strategies, no specific predictions will be made for the mediating effect of drinking context on the relationship.

**Hypothesis 2b:** The relationship between negative evaluation fears (as assessed by the BFNE) and negative and safe drinking behaviors will be partially mediated by drinking context such that students with more social anxiety symptoms who drink in convivial, personal-intimate, or negative coping drinking contexts will report more negative and fewer safe drinking behaviors.
Question 3

To what extent does the predicted path model change as a function of gender and race?

_Hypothesis 3a:_ The predicted mediational relationship between social anxiety symptoms, drinking context, and negative and safe drinking behaviors will vary by gender. Although females with more social anxiety symptoms have been found to report more problematic drinking behaviors than males (e.g., Norberg et al., 2010), other researchers have noted the lack of gender differences between students with elevated social anxiety symptoms and their drinking patterns (e.g., Villarosa, Moorer, et al., 2014). Thus, no specific predictions will be made regarding gender differences in the predicted mediational model.

_Hypothesis 3b:_ The predicted mediational relationship between social anxiety symptoms, drinking context, and negative and safe drinking behaviors will vary by race. Due to the lack of research exploring racial differences among college students with social anxiety symptoms and their problematic and safe drinking behaviors, no predictions will be made regarding racial differences in the predicted mediational model.
CHAPTER II – METHODOLOGY

Participants and Procedures

Participants for the current study were comprised of 678 traditional-aged college students (M = 20.08, SD = 1.52) who have consumed alcohol in the past month and endorsed at least one symptom of social anxiety. Participants were recruited primarily through SONA, an online recruitment management system, which is available for undergraduates in psychology classes. Participants received class credit in exchange for their participation, which also required participants to pass both validity check items and complete at least 75% of the study measures. The survey took from 30-45 minutes. In order to obtain the necessary sample of White and Black male respondents to conduct invariance testing, additional recruiting methods included narrowing down the survey availability to only males on SONA and contacting the campus institutional research office to obtain contact information for all freshmen male college students.

Following recruitment, participants were provided a link to Qualtrics, a secure online survey system, and directed to the study’s informed consent page. After providing informed consent, participants were directed to the demographic questionnaire and measures concerning social anxiety symptoms, drinking contexts, and problematic and safe drinking behaviors. Participants completed the demographic questionnaire first, and all other measures were presented in a random order to reduce order effects. To ensure data integrity, there were two validity check items sporadically placed throughout the survey to identify careless responding (e.g., “Leave this item unanswered”; Meade & Craig, 2012). Thus, participants who missed either validity check item was eliminated from the study. Further, Huang, Curran, Keeney, Poposki, and DeShon (2012) outlined
the importance of examining response time to ensure participants spent an adequate amount of time on each survey. Thus, responses for participants who spent less time completing the survey compared to 95% of the sample were analyzed and excluded from the analyses if there was evidence of random responding (e.g., marking the same response option for an entire measure). A total of 968 college students participated in the current study. Nine participants were removed due to failing the validity check items, and 206 were removed due to missing data (i.e., failed to complete 75% of study measures). The survey was available for students to complete multiple semesters, which permitted students to complete the survey more than once. An additional 53 participants were removed due to completing the survey more than once. The decision to remove a data point was based on the survey completion date such that data from the first time participants completed the survey was retained. Finally, 22 participants were removed due to endorsing no social anxiety symptoms on the three social anxiety measures and six participants were removed for reporting no alcohol consumption (via Daily Drinking Questionnaire). Thus, the final sample was comprised of 678 traditional-aged college students.

Measures

Demographic Questionnaire

Participants completed a brief demographic questionnaire examining participant sex, race, relationship status, year in school, among others.

Social Anxiety
Social Interaction Anxiety Scale (SIAS) and Social Phobia Scale (SPS). Mattick and Clarke (1998) developed the SIAS and SPS as companion measures to examine the multidimensionality of social anxiety symptoms. Specifically, the SIAS is a 20-item self-report measure that assesses fears related to social interactions (e.g., I become tense if I have to talk about myself or my feelings), and the SPS is a 20-item self-report measure that assesses fears related to performing everyday activities (e.g., I worry about shaking or trembling when I’m watched by other people). Participants respond on both measures using a 5-point Likert scale ranging from 1 (Not true at all for me) to 5 (Extremely true for me) with higher scores indicating more social anxiety symptoms; however, three items on the SIAS are reverse-scored prior calculating a composite score (i.e., I am at ease meeting people at parties, etc., I find it easy to think of things to talk about, and I find it easy to make friends my own age). Following the DSM-III-r diagnostic criteria for Social Anxiety Disorder, the researchers focused on developing measures that will identify respondents with clinically significant social anxiety. The SIAS and SPS are the most commonly used measures to assess social anxiety symptoms and continue to be used to assess clinically significant social anxiety among respondents following the DSM 5 diagnostic criteria. The SIAS and SPS have been found to be reliable and valid measures with undergraduate students. From their development article, Mattick and Clarke (1998) found strong internal consistency for the SIAS (α = .93) and SPS (α = .89) in a sample of undergraduate students and strong inter-rater reliability within a four-week (SIAS: r = .92; SPS: r = .91) and 12-week (SIAS: r = .92; SPS: r = .93) time period. Internal consistency for the current sample was excellent for SIAS (α = .93) and SPS (α = .95).
Brief Fear of Negative Evaluation (BFNE). The BFNE is a modified version of the original Fear of Negative Evaluation scale (FNE; Leary, 1983). The BFNE is an eight-item self-report measure of the evaluation fears dimension of social anxiety (Weeks et al., 2005). Modifications to the original FNE include reducing the number of items and modifying the response format from a true/false to a 5-point Likert scale ranging from 1 (not at all characteristic of me) to 5 (extremely characteristic of me). Sample items include I am afraid that people will find fault in me and I am usually worried about what kind of impression I make. Higher scores indicate more fears of negative evaluation from others. The 12-item BFNE has been shown to be a valid and reliable measure with undergraduates; however, more recent investigations have found stronger support for a two-factor structure of the BFNE wherein eight items were the straightforward worded items (factor one) and the remaining four were the reverse-scored items (factor two; Carleton, McCreary, Norton, & Asmundson, 2006; Weeks et al., 2005). Weeks and colleagues (2005) found stronger internal consistency for the eight-item BFNE (α = .90) compared to the four-item BFNE reverse items (α = .67) in a sample of undergraduate students. Further, the eight-item factor was significantly correlated with other social anxiety measures, highlighting the similarity but also distinctiveness between different dimensions of the social anxiety construct (Weeks et al., 2005). Due to the stronger psychometric analyses of the eight-item BFNE-r, the current study will only examine participant responses on the eight straightforward items of the BFNE to capture those students who experience evaluations fears, likely due to social anxiety symptoms. Internal consistency of the current sample was excellent for the eight-item BFNE (α = .94).
Negative Drinking Patterns

Daily Drinking Questionnaire (DDQ). Alcohol consumption was assessed using the DDQ (Collins, Parks, & Marlatt, 1985). Respondents indicated the number of alcoholic beverages consumed for each day in a typical past week, and researchers sum the number of reported standard drinks to get the total number of standard drinks consumed.

Alcohol Use Disorders Identification Test (AUDIT). Hazardous drinking was assessed using the AUDIT (Saunders, Aasland, Babor, De La Fuente, & Grant, 1993), a 10-item self-report measure that has been shown to predict the likelihood of engaging in risky drinking patterns (e.g., How often do you have six or more drinks on one occasion). Specifically, the AUDIT is characterized as the gold standard for identifying risky drinking patterns among respondents across different cultural and age groups, including college students (e.g., Kokotailo et al., 2004). Higher scores indicate a greater likelihood of hazardous drinking patterns with a clinical cutoff score of eight for college students, indicating likelihood of developing an alcohol use disorder (Devos-Comby & Lang, 2008). The AUDIT has been found to be valid and reliable with undergraduate students with a 98 percent sensitivity to detecting students with problem drinking (Saunders et al., 1993) and a strong internal consistency (α = .80; Fleming, Barry, & MacDonald, 1991). Internal consistency of the current sample was good for the AUDIT (α = .82).

Rutgers Alcohol Problem Index (RAPI). Alcohol-related negative consequences was assessed using the RAPI (Earleywine, LaBrie & Pedersen, 2008), a 23-item self-report measure that assesses a wide range of negative consequences (e.g., neglected your responsibilities). Respondents indicated how often they experienced a specific alcohol-
related negative consequences using a 5-point Likert scale ranging from 0 (never) to 4 (more than 10 times). The RAPI is comprised of three subscales (i.e., abuse/dependence, personal, and social consequences); however, the developers did not consider multiple dimensions of alcohol-related negative consequences when creating the RAPI and subsequent researchers tend to focus on the composite score of alcohol-related negative consequences (Martens, Neighbors, Dams-O’Connor, Lee, & Larimer, 2007). The current study examined the respondents total score on the RAPI, with values ranging from 0-92 with higher scores indicating more alcohol-related negative consequences experienced. The RAPI is considered a reliable and valid measure for undergraduate college students (α = .88; Earleywine et al., 2008) Internal consistency of the current sample was excellent for the RAPI (α = .95).

Safe Drinking Behaviors

Protective Behavioral Strategies Scale-revised (PBSS-r). The PBSS-r is a modified version of the original Protective Behavioral Strategies Scale (Martens et al., 2005). The PBSS-r is an 18-item self-report measure examining the frequency of PBS use while drinking (Madson, Arnau, et.al, 2013). Modifications to the original PBSS include adding three new items to improve the internal consistency, which subsequently modified the PBSS factor structure. Specifically, the original PBSS was comprised of three PBS categories including Stopping/Limiting Drinking (SLD; e.g., stopping drinking at a predetermined time), Manner of Drinking (MOD; e.g., avoiding drinking games), and Serious Harm Reduction (SHR; e.g., using a designated driver). After Madson, Arnau, and colleagues (2013) added three new items to the SHR category, the PBSS-r factor structure was comprised of two categories wherein the items from the SLD and MOD
combined to encompass the Controlled Consumption category of PBS and the SHR category remained its own factor. The new factor structure is consistent with DeMartini and colleagues (2013) who found the types of PBS were better explained as direct (e.g., controlled consumption) and indirect (e.g., serious harm reduction) strategies.

Thus, the PBSS-r is an 18-item self-report measure that asks respondents to “indicate the degree to which you engage in the following behaviors while drinking or partying” using a 6-point Likert scale ranging from 1 (never) to 6 (always). Higher scores indicate more PBS use. The PBSS-r is comprised of two categories including Controlled Consumption (CC; e.g., alternate alcoholic and non-alcoholic drinks) and Serious Harm Reduction (SHR; e.g., know where your drink has been at all times). The PBSS-r has been found to be reliable and valid with undergraduate college students with internal consistencies ranging from good to excellent for the PBSS-r total and subscales (Total: .89-.91; CC: \( \alpha = .88-.92 \); SHR: \( \alpha = .75-.84 \)), and the measure has also been shown to be invariant across gender and racial demographics (Madson, Arnau, et al., 2013). Further, convergent validity was revealed when comparing the PBSS-r to alcohol consumption (i.e., via the DDQ) and alcohol-related negative consequences (i.e., via the RAPI). Internal consistency of the current sample was excellent for CC (\( \alpha = .93 \)) and SHR (\( \alpha = .89 \)).

**Strategies Questionnaire (SQ).** The SQ is a 27-item self-report measure examining the frequency of drinking control strategies used (Sugarman & Carey, 2007). Participants responded using a 6-point Likert scale ranging 0 (none) to 6 (more than 10 times) with higher scores indicating more strategy use. The SQ is comprised of three categories, including Selective Avoidance (e.g., choose not to do shots when available),
Strategies while Drinking (e.g., space drinks over time), and Alternatives to Drinking (e.g., finding other ways besides drinking to reduce stress). The SQ has been found to be reliable and valid with undergraduate college students (Sugarman & Carey, 2007), with internal consistencies ranging from adequate to good for the three subscales (α = 0.76 to 0.82). Due to the overlap in item content between the PBSS-r categories and two of the SQ categories (i.e., Selective Avoidance and Strategies while Drinking), the current study examined participant responses on the Alternatives to Drinking strategies of the SQ to capture those students who manage negative affect in ways other than drinking. Internal consistency of the current sample was excellent for the Alternatives to Drinking subscale (α = .89).

Drinking Context

Drinking Context Scale (DCS). The DCS is a nine-item self-report measure examining the likelihood of heavy drinking in various drinking settings (O’Hare, 2001). Participants responded using a 5-point Likert scale ranging from 1 (extremely low) to 5 (extremely high), with higher scores indicating more heavy drinking in the context. The DCS is comprised of three drinking contexts, which takes into considering the social, situational, and emotional aspects of one’s drinking environment, including convivial drinking context (i.e., social, celebratory drinking situations), personal-intimate drinking context (i.e., romantic drinking situations), and negative coping drinking context (i.e., drinking to manage negative emotions). Sample items include “when I’m at a bar or club” (e.g., convivial), “when I’m on a date” (e.g., personal-intimate), and “when I’m lonely or homesick” (e.g., negative coping). The DCS has been found to be a reliable and valid measure with undergraduate college students, with concurrent validity found with
the AUDIT (O’Hare, 2001). O’Hare (2001) found strong support for the three-factor structure of the nine-item DCS and internal consistencies were adequate for each of the three subscales ($\alpha = 0.81$ to 0.85). Internal consistencies of the current sample were acceptable for the convivial ($\alpha = .80$), personal-intimate ($\alpha = .92$), and negative coping drinking ($\alpha = .84$) contexts.

**Data Analytic Approach**

Prior to analyzing the predicted path model, data were cleaned to address missing data and potential outlier concerns. Specifically, participants were excluded from analyses if they did not complete at least 75% of the survey, or if they missed at least one of the two validity check items included in the survey. Any remaining missing data was corrected using linear trend at point, and outliers were corrected through truncation. Additionally skewness and kurtosis were examined following the plus or minus three standard deviation cutoff. Following cleaning procedures, Cronbach’s alphas were calculated for all measures. Descriptive analyses were conducted to examine the means and standard deviations of each measure, as well as bivariate correlations to assess the relationships among all measures. Finally, independent samples t-tests were calculated to examine gender and racial differences across the social anxiety and drinking-related measures.

To examine questions one and two, a multiple mediation model was analyzed following a Structural Equation Modeling (SEM) framework using the M-Plus 7.11 (Muthen & Muthen, 2012). Specifically, three dimensions of social anxiety (i.e., SPS, SIAS, and BFNE) served as predictors, three drinking contexts (i.e., convivial, personal-intimate, and negative coping drinking contexts) served as mediators, and six alcohol-
related variables (i.e., alcohol consumption, hazardous drinking, alcohol-related negative consequences, controlled consumption strategies, serious harm reduction strategies, and alternatives to drinking strategies) served as the outcome variables. There are multiple advantages to using an SEM framework for a multiple mediation model, including the ability to test multiple predictors, mediators, and outcomes simultaneously, the data does not need to be normally distributed, and there are fewer inferential tests being conducted which reduces the likelihood of Type I error (Schumacker & Lomax, 2004). While a major advantage of SEM is the ability to calculate global fit statistics for the predicted model, the additional advantage to correlate the error terms of the mediators (i.e., drinking contexts) as well as the outcome variables (i.e., alcohol-related outcomes) in the model would reduce the degrees of freedom for the model to zero. Thus, the current model will be described as just identified wherein parameter estimates are identified, but global fit statistics are not reported. Because the three drinking contexts and the six alcohol-related outcome variables should have moderate to strong correlations among themselves, it makes theoretical sense to account for their relationship.

To correct for any skewed data, Preacher and Hayes (2004) recommend conducting a bootstrapping technique, which is a non-parametric approach to effect-size estimation that makes no assumptions about the sample distribution. The bootstrapping technique involves the extraction of 5,000 resamples, and the mediational effect being calculated for each of these resamples. To examine the amount of variance explained by the mediator(s) on the outcome variables, the product of paths $a$ and $b$ were divided by path $c$ (Preacher & Hayes, 2004). Statistical researchers have acknowledged the difficulty in determining the strength of a single mediator on a given relationship in
psychological research, noting that there are multiple variables that can explain a given relationship between two psychosocial variables (e.g., drinking motives have also been found to mediate the relationship between social anxiety symptoms and alcohol-related outcomes; Villarosa, Madson, et al., 2014). Further, full mediation requires the relationship between the predictor and the outcome to reduce to zero once the mediator is entered, whereas partial mediation only requires a reduction in the relationship value between the predictor and the outcome. Thus, the predicted drinking context mediators were expected to serve as partial mediators in the relationship social anxiety dimensions have with various alcohol-related outcomes.

To examine question three, a moderated mediation model was analyzed following a SEM framework using M-Plus 7.11 (Muthen & Muthen, 2012). Edwards and Lambert (2007) emphasize that if the model predicts that the relationship between the predictor and mediator will depend on the moderator, such as outline in the current study, then following an SEM framework conducts moderated-mediation and mediated-moderation analyses the same; however, they are conceptually interpreted differently. Specifically, a moderated-mediation model suggests that the mediational effect varies by the moderator; whereas, a mediated-moderation model suggest that an interaction effect between the predictor and moderator impacts the mediator, which in turn, affects the outcome variable. When considering theory and past literature, the current study is examining whether the predict mediation model varies by the moderator, and thus, the model would conceptually be considered a moderated-mediation model.

The multiple-mediation model described for the first two research questions were used with the addition of gender as a moderator for the paths between the predictor
variables and the mediator variables. All advantages to taking a multiple mediation approach (described above) are also beneficial for conducting a moderated-mediation analysis. Additional advantages to using a SEM approach for a moderated mediation model includes examining all possible relationships of the moderator on the multiple-mediation model (e.g., moderated mediation and mediated moderation predictions), seeing potential changes in the mediation relationship at different levels of the moderator, and determining confidence intervals for the mediated effects at different levels of the moderator (Edwards & Lambert, 2007). A second moderated-mediation analysis was conducted on the predicted mediation model, but replaced gender with race as the moderator.
CHAPTER III - RESULTS

Means, standard deviations, and intercorrelations of all study measures are provided in Table 1. In terms of severity of social anxiety symptoms, approximately 35% of participants met clinical cutoff for social anxiety via the SIAS, 54% met cutoff via the SPS, and 18% met cutoff via the BFNE. Further, approximately 33% of participants exceeded the clinical cutoff on the AUDIT, which identifies individuals at risk for developing an alcohol use disorder. Finally, participants were classified as low, moderate, or heavy drinkers using the DDQ classification (Collins et al., 1985). Overall, approximately 17% of participants were classified as low drinkers (i.e., 3 or less drinks), 41% were classified as moderate drinkers (i.e., 4 to 11 drinks), and 42% were classified as heavy drinkers (i.e., more than 12 drinks). Correlation analyses revealed that each of the three social anxiety dimensions was positive related to negative coping drinking contexts, but not to convivial or personal-intimate drinking contexts. Further, all social anxiety dimensions were positively related to hazardous drinking and negative consequences and unrelated to alcohol consumption. Finally, only performance- and interaction-related social anxiety dimensions were negatively related to SHR PBS, and no social anxiety dimension was related to alternatives to drinking strategies.
Table 1

Means, Standard Deviations, and Intercorrelations of Measures

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Interaction Anxiety</td>
<td>---</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Performance Anxiety</td>
<td>.67**</td>
<td>---</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Evaluation Anxiety</td>
<td>.59**</td>
<td>.58**</td>
<td>---</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Convivial</td>
<td>.01</td>
<td>-.03</td>
<td>.02</td>
<td>---</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Personal-Intimate</td>
<td>.06</td>
<td>.06</td>
<td>.05</td>
<td>.45**</td>
<td>---</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Negative Coping</td>
<td>.21**</td>
<td>.16**</td>
<td>.14**</td>
<td>.35**</td>
<td>.45**</td>
<td>---</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Alcohol Consumed</td>
<td>.05</td>
<td>-.01</td>
<td>-.02</td>
<td>.30**</td>
<td>.23**</td>
<td>.24**</td>
<td>---</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Hazardous Drinking</td>
<td>.16**</td>
<td>.13**</td>
<td>.13**</td>
<td>.46**</td>
<td>.32**</td>
<td>.37**</td>
<td>.51**</td>
<td>---</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Negative Consequences</td>
<td>.25**</td>
<td>.21**</td>
<td>.18**</td>
<td>.31**</td>
<td>.32**</td>
<td>.29**</td>
<td>.43**</td>
<td>.57**</td>
<td>---</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. CC</td>
<td>-.08*</td>
<td>-.02</td>
<td>-.01</td>
<td>-.33**</td>
<td>-.22**</td>
<td>-.26**</td>
<td>-.24**</td>
<td>-.34**</td>
<td>-.22**</td>
<td>---</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. SHR</td>
<td>-.16**</td>
<td>-.10**</td>
<td>-.03</td>
<td>-.16**</td>
<td>-.21**</td>
<td>-.28**</td>
<td>-.24**</td>
<td>-.28**</td>
<td>-.33**</td>
<td>.61**</td>
<td>---</td>
<td></td>
</tr>
<tr>
<td>12. ATD strategies</td>
<td>-.05</td>
<td>-.01</td>
<td>-.01</td>
<td>-.13**</td>
<td>-.12**</td>
<td>-.20**</td>
<td>-.09</td>
<td>-.10**</td>
<td>-.03</td>
<td>.28**</td>
<td>.29**</td>
<td>---</td>
</tr>
</tbody>
</table>

*Mean* | 27.51 | 26.99 | 19.62 | 10.12 | 7.27  | 6.46  | 15.13 | 7.32  | 10.90 | 45.00 | 29.65 | 13.31 |

*SD*  | 15.29 | 18.21 | 8.23  | 2.98  | 2.90  | 3.27  | 18.39 | 5.38  | 12.86 | 14.98 | 7.13  | 5.90  |

Note: CC = Controlled Consumption; SHR = Serious Harm Reduction; ATD = Alternatives to Drinking; SD = Standard Deviation. *p < .01; *p < .05
Structural Equation Model

Global fit statistics. The current study examined a multiple mediation model utilizing a structural equation model framework to explore the mediating role of three different drinking contexts on the relationship between three dimensions of social anxiety and six alcohol-related outcomes (see Figure 1). While examining global fit statistics is a primary advantage of using a structural equation model, the added benefit of correlating error terms for variables that are conceptually related allows for greater confidence in findings and elimination of shared variance (Muthen & Muthen, 2007). For the current analysis, the conceptual similarity between the three social anxiety dimensions, the three drinking contexts, and the six alcohol-related outcomes warranted correlation of each of these error terms to account for their relationship (see Table 2). As a result, the degrees of freedom is zero, and the multiple mediation model is described as just identified, which allows for parameter estimates to be interpreted, but not global fit statistics (Muthen & Muthen, 2007).
Figure 1. Predicted Multiple Mediation Model

Predicted multiple mediation model between three dimensions of social anxiety, three drinking contexts, and six alcohol-related outcome variables. Correlations between the predictors, mediators, and outcome variables have been excluded for parsimony; however, please refer to Table 2.
Table 2

Correlation Coefficients for the Three Social Anxiety Dimensions, Three Drinking Contexts, and Six Alcohol-related Outcomes

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Social Anxiety Dimensions</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Performance-related</td>
<td>---</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Interaction-related</td>
<td>.58</td>
<td>---</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Evaluation-related</td>
<td>.59</td>
<td>.67</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drinking Contexts</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Convivial</td>
<td>---</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Personal-Intimate</td>
<td>.45</td>
<td>---</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Negative Coping</td>
<td>.36</td>
<td>.45</td>
<td>---</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alcohol-related Outcomes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Alcohol Consumption</td>
<td>---</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Hazardous Drinking</td>
<td>.43</td>
<td>---</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Negative Consequences</td>
<td>.35</td>
<td>.46</td>
<td>---</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Controlled Consumption</td>
<td>-.13</td>
<td>-.18</td>
<td>-.09*</td>
<td>---</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Serious Harm Reduction</td>
<td>-.17</td>
<td>-.17</td>
<td>-.24</td>
<td>.58</td>
<td>---</td>
<td></td>
</tr>
<tr>
<td>6. Alternatives to Drinking</td>
<td>-.03</td>
<td>-.01</td>
<td>.05</td>
<td>.23</td>
<td>.24</td>
<td>---</td>
</tr>
</tbody>
</table>

Note. All significant correlation coefficients are bold (p < .05)

The first two hypotheses examined the direct relationship between the three dimensions of social anxiety and the six alcohol-related outcomes. First, it was predicted that interaction-related social anxiety and performance-related social anxiety would be positively related to hazardous drinking and alcohol-related negative consequences, negatively related to serious harm reduction PBS and alternatives to drinking strategies, and unrelated to alcohol consumption and controlled consumption PBS (1a). Second, it was predicted that evaluation fear-related social anxiety would be positively related to hazardous drinking and alcohol-related negative consequences, negatively related to controlled consumption PBS, serious harm reduction PBS, and alternatives to drinking strategies, and unrelated to alcohol consumption (1b).
While focusing on correlation coefficients of the social anxiety and alcohol-related outcomes measures suggest significant relationships as predicted, it is important to determine the predictive relationship between social anxiety and alcohol-related outcomes with all variables included into a larger measurement model (see Table 3). Based on the larger measurement model, hypothesis 1a (i.e., performance and interaction related social anxiety would be positively related to hazardous drinking and negative consequences, and negatively related to safe drinking behaviors) was not supported. In fact, contrary to predictions, only performance-related social anxiety was directly related to serious harm reduction PBS such that students who reported more performance-related social anxiety reported more serious harm reduction PBS. Hypothesis 1b, on the other hand, was partially supported such that students who reported more evaluation fear-related social anxiety also reported more hazardous drinking and alcohol-related negative consequences, and less controlled consumption and serious harm reduction PBS (see Table 3). However, contrary to predictions, evaluation fears were positively related to alcohol consumption and unrelated to alternative to drinking strategies. Thus, it appears that evaluation fear-related social anxiety served as the only predictor of problematic drinking patterns in the current sample of college students.

The next two hypotheses examined the extent to which drinking context mediated the relationships each of the three dimensions of social anxiety symptoms had with negative and safe drinking behaviors (i.e., 2a and 2b). For hypothesis 2a, it was predicted that the relationship between interaction-related and performance-related social anxiety and problematic and safe drinking behaviors would be partially mediated by negative
coping and personal-intimate drinking contexts. Specifically, students with more interaction- or performance-related social anxiety who drink in personal-intimate or negative coping drinking contexts would report more problematic and fewer safe drinking behaviors. For hypothesis 2b, it was predicted that the relationship between evaluation fear-related social anxiety and problematic and safe drinking behaviors would be partially mediated by the three drinking contexts. However, no specific predictions were made due to the lack of research examining this dimension of social anxiety in relation to drinking contexts and a range of alcohol-related outcomes. A multiple mediation analysis was conducted following a structural equation modeling framework, and all significant path coefficients are shown in Figure 2. Further, the total (c), direct (c'), and indirect parameter estimates (i.e., standardized betas) are presented in Table 3. While a single multiple mediation analysis was conducted, results are presented by alcohol-related outcome for ease of readability.
Figure 2. Observed Multiple Mediation Model

Note: Observed multiple mediation model with only significant path coefficients (as represented by standardized betas) between social anxiety, drinking context, and alcohol-related outcomes.
Table 3

**Total, Direct, and Indirect Effects of Social Anxiety Dimensions on Alcohol-related Outcomes**

<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>DDQ</th>
<th>AUDIT</th>
<th>RAPI</th>
<th>CC</th>
<th>SHR</th>
<th>ATD</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>β</td>
<td>p</td>
<td>β</td>
<td>p</td>
<td>β</td>
<td>p</td>
</tr>
<tr>
<td><strong>Social anxiety dimensions:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Performance-related</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total effect</td>
<td>-.06</td>
<td>.14</td>
<td>.05</td>
<td>.39</td>
<td>.04</td>
<td>.44</td>
</tr>
<tr>
<td>Direct effect</td>
<td>-.07</td>
<td>.05</td>
<td>.03</td>
<td>.54</td>
<td>.02</td>
<td>.57</td>
</tr>
<tr>
<td>Indirect effect</td>
<td>.01</td>
<td>.50</td>
<td>.02</td>
<td>.48</td>
<td>.01</td>
<td>.58</td>
</tr>
<tr>
<td>Specific Indirect effects</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Convivial</td>
<td>.01</td>
<td>.39</td>
<td>.02</td>
<td>.38</td>
<td>.01</td>
<td>.39</td>
</tr>
<tr>
<td>Personal-intimate</td>
<td>.00</td>
<td>.90</td>
<td>.00</td>
<td>.91</td>
<td>.00</td>
<td>.90</td>
</tr>
<tr>
<td>Negative coping</td>
<td>.00</td>
<td>.80</td>
<td>.00</td>
<td>.80</td>
<td>.00</td>
<td>.81</td>
</tr>
<tr>
<td><strong>Interaction-related</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total effect</td>
<td>-.06</td>
<td>.32</td>
<td>.02</td>
<td>.80</td>
<td>.07</td>
<td>.18</td>
</tr>
<tr>
<td>Direct effect</td>
<td>-.04</td>
<td>.40</td>
<td>.04</td>
<td>.45</td>
<td>.08</td>
<td>.09</td>
</tr>
<tr>
<td>Indirect effect</td>
<td>-.01</td>
<td>.56</td>
<td>-.02</td>
<td>.48</td>
<td>-.01</td>
<td>.71</td>
</tr>
<tr>
<td>Specific Indirect effects</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Convivial</td>
<td>-.02</td>
<td>.20</td>
<td>-.03</td>
<td>.19</td>
<td>-.02</td>
<td>.22</td>
</tr>
<tr>
<td>Personal-intimate</td>
<td>.00</td>
<td>.71</td>
<td>.00</td>
<td>.72</td>
<td>.01</td>
<td>.67</td>
</tr>
<tr>
<td>Negative coping</td>
<td>.00</td>
<td>.64</td>
<td>.01</td>
<td>.62</td>
<td>.00</td>
<td>.65</td>
</tr>
<tr>
<td><strong>Evaluation fear-related</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total effect</td>
<td>.12</td>
<td>.03</td>
<td>.12</td>
<td>.04</td>
<td>.18</td>
<td>.00</td>
</tr>
<tr>
<td>Direct effect</td>
<td>.09</td>
<td>.09</td>
<td>.07</td>
<td>.17</td>
<td>.15</td>
<td>.01</td>
</tr>
<tr>
<td>Indirect effect</td>
<td>.04</td>
<td>.11</td>
<td>.05</td>
<td>.09</td>
<td>.03</td>
<td>.16</td>
</tr>
<tr>
<td>Specific Indirect effects</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Convivial</td>
<td>.01</td>
<td>.51</td>
<td>.01</td>
<td>.50</td>
<td>.01</td>
<td>.51</td>
</tr>
<tr>
<td>Personal-intimate</td>
<td>.00</td>
<td>.58</td>
<td>.00</td>
<td>.59</td>
<td>.01</td>
<td>.53</td>
</tr>
<tr>
<td>Negative coping</td>
<td>.02</td>
<td>.05</td>
<td>.03</td>
<td>.02</td>
<td>.02</td>
<td>.07</td>
</tr>
</tbody>
</table>

Note: All significant beta coefficients are bold (p < .01). All parameter estimates and significance test are based on 5,000 bootstrapped samples. DDQ = Daily Drinking Questionnaire; AUDIT = Alcohol Use Identification Test; RAPI = Rutgers Alcohol Problem Index; CC = Controlled Consumption; SHR = Serious Harm Reduction; ATD = Alternatives to Drinking.
Social anxiety, drinking context, and alcohol consumption. The first set of parameters examined the mediating role of three drinking contexts (i.e., convivial, personal-intimate, and negative coping drinking contexts) on the relationship between social anxiety dimensions and alcohol consumption. Fear of negative evaluation was the only social anxiety dimension that had a direct relationship with alcohol consumption (c = .12, p = .03). Further, after adding the three drinking contexts as mediators into the model, the direct relationship became non-significant (c’ = .09, p = ns). Specifically, negative coping drinking contexts served as the only significant mediator (β = .02, p = .05), which accounted for 20% of the variance in the relationship between fear of negative evaluation and alcohol consumption. Further, the absolute value change in the direct relationship after adding the mediators was .03, which is considered a small effect size (Kenny, 2015). Thus, fear of negative evaluation symptoms predicted an increase in negative coping drinking contexts (β = .18, p = .001). In turn, negative coping contexts predicted an increase in alcohol consumption (β = .13, p = .003). Finally, the bootstrap analyses suggested significant mediation at the 95% confidence intervals for negative coping drinking context (CI_{lower} = .01, CI_{higher} = .06). Thus, fear of negative evaluation was related to drinking in more negative coping contexts, which in turn, was related to consuming more alcohol.

Social anxiety, drinking context, and hazardous drinking. The second set of parameters examined the mediating role of drinking contexts in the relationship between social anxiety dimensions and hazardous drinking. Fear of negative evaluation was the only social anxiety dimension that was directly related to the hazardous drinking (c = .12,
After including drinking contexts into the model, the direct relationship became non-significant \( (c' = .07, p = \text{ns}) \). Specifically, negative coping drinking contexts served as the only significant mediator \( (\beta = .03, p < .05) \), which accounted for 29% of the variance in the relationship between fear of negative evaluation and hazardous drinking. Further, the absolute value change in the direct relationship after adding the mediators was .05, which is considered a small effect size. Thus, fear of negative evaluation symptoms predicted an increase in drinking in negative coping contexts \( (\beta = .18, p = .001) \). In turn, negative coping contexts predicted an increase in hazardous drinking \( (\beta = .19, p < .001) \). Finally, bootstrap analyses suggested significant mediation at the 95% confidence interval for negative drinking contexts \( (CI_{\text{lower}} = .01, CI_{\text{higher}} = .07) \). Thus, fear of negative evaluation was related to drinking in more negative coping contexts, which in turn, was related to engaging in more hazardous drinking.

**Social anxiety, drinking context, and negative consequences.** The third set of parameters examined the mediating role of drinking contexts in the relationship between social anxiety dimensions and alcohol-related negative consequences. Fear of negative evaluation was the only social anxiety dimension directly related to alcohol-related negative consequences \( (c = .18, p = .002) \). After including drinking contexts as mediators in the model, the direct relationship reduced \( (c' = .15, p = .006) \). Negative coping drinking contexts served as the only significant mediator \( (\beta = .02, p = .07) \), which accounted for 10% of the variance in the relationship between fear of negative evaluation and alcohol-related negative consequences. Further, the absolute value change in the direct relationship after including the mediators was .03, which is considered a small
effect size. Thus, fear of negative evaluation symptoms predicted an increase in negative coping drinking contexts ($\beta = .18, p = .001$). In turn, negative coping contexts predicted an increase in negative consequences ($\beta = .10, p = .021$). Finally, bootstrap analyses suggested significant mediation at the 95% confidence interval for negative drinking contexts ($CI_{lower} = .00, CI_{higher} = .04$). Thus, fear of negative evaluation was related to drinking in more negative coping contexts, which in turn, was related to more alcohol-related negative consequences.

Social anxiety, drinking context, and controlled consumption PBS. The fourth set of parameters examined the mediating role of drinking contexts on the relationship between social anxiety dimensions and controlled consumption PBS (i.e., CC). Fear of negative evaluation was the only social anxiety dimension directly related to CC ($c = -.15, p = .012$). After including the different drinking contexts into the models as mediators, the direct relationship reduced ($c' = -.11, p = .053$). Negative coping drinking contexts was the only significant mediator ($\beta = -.03, p < .05$), which accounted for 18% of the variance in the relationship between fear of negative evaluation and CC. Further, the absolute value change in the direct relationship after including the mediators was .04, which is a small effect size. Thus, fear of negative evaluation symptoms predicted an increase in negative coping drinking contexts ($\beta = .18, p = .001$). In turn, negative coping contexts predicted a decrease in CC ($\beta = -.15, p = .001$). Finally, bootstrap analyses suggested significant mediation at the 95% confidence interval for negative drinking contexts ($CI_{lower} = -.06, CI_{higher} = -.01$). Thus, fear of negative evaluation was related to
drinking in more negative coping contexts, which in turn, was related to using fewer controlled consumption PBS.

*Social anxiety, drinking context, and serious harm reduction PBS.* The fifth set of parameters examined the mediating role of drinking contexts on the relationship between social anxiety dimensions and serious harm reduction PBS (i.e., SHR). Performance-related anxiety ($c = .12, p = .021$) and fear of negative evaluation ($c = -.21, p = .000$) were the only two dimensions of social anxiety that were directly related to SHR. For performance-related anxiety, after including the drinking contexts as mediators into the model, the direct relationship became stronger ($c' = .13, p = .01$), which suggests that drinking context does not play a role in the relationship between performance-related social anxiety and SHR. In terms of fear of negative evaluation, the direct relationship reduced after including drinking contexts into the model ($c' = -.17, p = .001$). Negative coping drinking contexts served as the only significant mediator ($\beta = -.04, p < .01$), which accounted for 17% of the variance in the relationship between fear of negative evaluation and SHR. Further, the absolute value change in the direct relationship after including the mediators was .04, which is a small effect size. Thus, fear of negative evaluation symptoms predicted an increase in negative coping drinking contexts ($\beta = .18, p = .001$). In turn, negative coping contexts predicted a decrease in SHR ($\beta = -.20, p < .001$). Finally, bootstrap analyses suggested significant mediation at 95% confidence interval for negative coping drinking contexts ($CI_{lower} = -.07, CI_{higher} = -.02$). Thus, performance-related social anxiety was related to serious harm reduction PBS, regardless of drinking context. On the other hand, fear of negative evaluation was related to drinking in more
negative coping contexts, which in turn, was related to using fewer serious harm reduction PBS.

Social anxiety, drinking context, and alternatives to drinking. The final set of parameters examined the mediating role of drinking contexts on the relationship between social anxiety dimensions and alternatives to drinking strategies. No social anxiety dimension was directly related to alternatives to drinking strategies, and the direct relationships remain non-significant after including the different drinking contexts into the model. However, there was a significant indirect relationship between fear of negative evaluation and alternatives to drinking through negative coping drinking contexts ($\beta = -.03$, $p = .019$). Specifically, fear of negative evaluation predicted an increase in negative coping drinking contexts ($\beta = .18$, $p = .001$), and negative coping drinking context predicted a decrease in alternatives to drinking strategies ($\beta = -.18$, $p < .001$). Further, bootstrap analyses suggested a significant indirect effect at the 95% confidence interval for negative coping drinking contexts ($CI_{lower} = -.06$, $CI_{higher} = -.01$). Specifically, fear of negative evaluation was unrelated to alternatives to drinking strategies; however, these students reported drinking in more negative coping contexts, and students who reported drinking in more negative coping drinking contexts also reported using fewer alternatives to drinking strategies.

Multigroup Invariance Testing

Model fit and invariance statistics. In order to examine whether the predicted multiple mediation model (as shown in Figure 1) differed by gender or race, two separate multigroup analyses were conducted; one examined differences by gender and the other
by race. Muthen and Muthen (2007) outlined a series of steps to examine model invariance among multiple groups. The primary advantage to conducting a multigroup analysis versus incorporating groups as covariates into the predicted model is the ability to explore each parameter in the predicted model to identify where group differences exist. Although a disadvantage of multigroup analyses is the need for a larger sample size (Muthen & Muthen, 2007), and chi-square statistic is sensitive to sample size, researchers have noted the importance of examining multiple global fit indices to correct for the sensitivity of the $\chi^2$ statistic to sample size (Byrne, Stewart, Kennard, & Lee, 2007; Cheung & Rensvold, 2002). Specifically, Chen (2002) recommends including the change in Comparative Fit Index (CFI; Bentler, 1990) and Root Mean Square Error of Approximation (RMSEA; Steiger, 1990) global fit indices as indicators of measurement invariance because they are less affected by sample size and model complexity. The recommended cutoffs for these fit indices are less than or equal to .01 for CFI and greater than or equal to .015 for RMSEA. Thus, the current study reported three global fit indices to ensure any noninvariant parameters in the predicted mediational model were both statistically and practically significant.

The multigroup analyses entailed a series of model testing that involved gradually constraining parameter estimates in order to determine which mediation analyses, if any, are significantly different between groups. Typically, the first step is to examine the predicted model fit for each group in order to establish the best fitting model for each group. For the purpose of the current study, each of the models for males, females, Whites, and Blacks were considered ‘just identified’ models because the error terms for
each of the predictor, mediating, and outcome variables were correlated (as described in the multiple mediation analyses above). The next step is to run a multigroup analysis of the predicted model with both groups included and all parameter estimates freed, which is labeled the configural model and provides the baseline fit statistics (i.e., the model that will be used to compare additional models to when examining specific parameter differences by group). Thus, the first and second step in the multigroup analysis provided the same results because the global fit statistics were ‘just identified.’ To determine if the multiple mediation model was noninvariant across groups, the next step involves testing the predicted model in all groups with all parameter estimates constrained equal across groups (i.e., fully constrained model), which provides the change in global fit statistics from a freely-estimated model to a fully constrained model. If there is not a significant change, then we can conclude that the predicted model is invariant across groups, and no additional steps are taken. However, if there is a significant change, the next step entails conducting a series of multigroup analyses that involve gradually constraining paths of the predicted model to examine which parameter estimates have group differences.

The final two hypotheses examined if the predicted multiple mediation model changed as a function of gender and race (i.e., 3a and 3b). Hypothesis 3a predicted that the mediational relationship between social anxiety symptoms, drinking context, and negative and safe drinking behaviors will vary by gender. Hypothesis 3b predicted that the mediational relationship between social anxiety symptoms, drinking context, and negative and safe drinking behaviors will vary by race. Model results are presented by group.
Male and female multigroup analyses. Fit statistics of the multiple mediation model for males and females are presented in Table 4. Baseline models were run for males and females separately prior to running multigroup analyses. Multigroup analyses are presented in Table 4 such that the first multigroup model examined configural invariance (i.e., model freeing all parameter estimates and error term correlations across both groups). Consistent with examining the separate baseline models by gender, fit statistics of the configural model was ‘just identified,’ indicating perfect fit. Model 2 entailed conducting a multigroup analysis with all parameter estimates and error term correlations constrained equal across groups. The purpose is to determine if the fit statistics, as evaluated by $\chi^2$ statistic, CFI, and RMSEA, becomes significantly worse once all parameters are constrained equal across groups. As can be seen in Table 4, the $\chi^2$ statistic became significantly worse in Model 2, indicating model variance across gender.

Subsequent models entailed gradually freeing parameters to determine which paths have significant gender differences (see Table 4). To begin, models were evaluated by mediator such that all paths leading from each predictor to a single mediator, and all paths leading from that single mediator to each of the outcome variables were constrained, while the remaining paths were freed across groups. Thus, three separate multigroup models were conducted, and no significant changes in global fit indices resulted from each of these analyses. The next step entailed examining multigroup model differences by each predictor. Specifically, all paths leading from a single predictor to each of the three mediators and from the three mediators to each of the outcome variables were constrained while the remaining paths were freed across groups. Thus, three
separate multigroup models were conducted, and no significant changes resulted from each of these analyses. The final step entailed examining multigroup model differences by each outcome variable. Specifically, all paths leading from the three predictors to each of the three mediators and from the three mediators to a single outcome variable were constrained while the remaining paths were freed across groups. Thus, six separate multigroup models were conducted, and as can be seen in Table 4, significant gender differences were found with alcohol consumption (as assessed via the DDQ), but no other outcome variables.

In order to determine where gender differences lie among the relationships between each of the predictors and mediators on alcohol consumption (see Table 5), the next step is to constrain all paths leading from each predictor to a single mediator, and then the path from that single mediator to alcohol consumption while all other paths were freed across groups. Thus, three more models were conducted, and significant gender differences were found with negative coping drinking contexts as the mediator, but no other differences were found with the other mediators. The final set of models examined entailed constraining the paths from each predictor separately on the relationship to negative coping drinking contexts, and in turn, as it is related to alcohol consumption. Thus, three models were conducted, and significant gender differences were found with each of the social anxiety predictors variables based on the $\chi^2$ statistic. However, the change in CFI and RMSEA global fit statistics did not meet the recommended cutoffs (i.e., CFI $\leq -.01$ and RMSEA $\geq .015$; Chen, 2007). Thus, while statistical significance
was indicated, the lack of change in multiple global fit indices suggests no practical gender differences were found.

Table 4

*Multigroup Analyses of the Multiple Mediation Model (Males and Females)*

<table>
<thead>
<tr>
<th>Model</th>
<th>Fit indices</th>
<th>CFI</th>
<th>RMSEA</th>
<th>ΔCFI</th>
<th>ΔRMSEA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model 1</td>
<td>Configural, no constraints</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Model 2</td>
<td>Fully constrained</td>
<td>104.167</td>
<td>66</td>
<td>.971</td>
<td>.042</td>
</tr>
<tr>
<td>Model 3</td>
<td>Convivial constrained</td>
<td>9.805</td>
<td>9</td>
<td>.999</td>
<td>.017</td>
</tr>
<tr>
<td>Model 4</td>
<td>Negative Coping constrained</td>
<td>14.058</td>
<td>9</td>
<td>.996</td>
<td>.042</td>
</tr>
<tr>
<td>Model 5</td>
<td>Personal-Intimated constrained</td>
<td>10.737</td>
<td>9</td>
<td>.999</td>
<td>.024</td>
</tr>
<tr>
<td>Model 6</td>
<td>Interaction-SA constrained</td>
<td>12.967</td>
<td>9</td>
<td>.997</td>
<td>.037</td>
</tr>
<tr>
<td>Model 7</td>
<td>Performance-SA constrained</td>
<td>10.347</td>
<td>9</td>
<td>.999</td>
<td>.022</td>
</tr>
<tr>
<td>Model 8</td>
<td>Evaluation Fear-SA constrained</td>
<td>8.232</td>
<td>9</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Model 9</td>
<td>Alcohol Consumption constrained</td>
<td>14.461</td>
<td>6</td>
<td>.994</td>
<td>.066</td>
</tr>
<tr>
<td>Model 10</td>
<td>Hazardous Drinking constrained</td>
<td>7.235</td>
<td>6</td>
<td>.999</td>
<td>.025</td>
</tr>
<tr>
<td>Model 11</td>
<td>Negative Consequences constrained</td>
<td>8.447</td>
<td>6</td>
<td>.998</td>
<td>.036</td>
</tr>
<tr>
<td>Model 12</td>
<td>Controlled Consumption constrained</td>
<td>5.953</td>
<td>6</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Model 13</td>
<td>Serious Harm Reduction constrained</td>
<td>7.448</td>
<td>6</td>
<td>.999</td>
<td>.027</td>
</tr>
<tr>
<td>Model 14</td>
<td>Alternative strategies constrained</td>
<td>5.738</td>
<td>6</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>

Note. All significant chi-square statistics are bold (p < .05). SA = Social Anxiety; CFI = Confirmatory Factor Index; RMSEA = Root Mean Square Error Approximation.
Table 5

*Multigroup Analyses of the Multiple Mediation Model with Alcohol Consumption*

*Constrained (Males and Females)*

<table>
<thead>
<tr>
<th>Model</th>
<th>Fit indices</th>
<th>χ²</th>
<th>df</th>
<th>CFI</th>
<th>RMSEA</th>
<th>ΔCFI</th>
<th>ΔRMSEA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Configural, no constraints</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0.00</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>DCS-Convivial constrained</td>
<td>2.305</td>
<td>4</td>
<td>1</td>
<td>0.00</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>3</td>
<td>DCS-Neg. Cope constrained</td>
<td>8.663</td>
<td>4</td>
<td>0.996</td>
<td>0.060</td>
<td>0.004</td>
<td>0.060</td>
</tr>
<tr>
<td>4</td>
<td>DCS-Intimate constrained</td>
<td>1.784</td>
<td>4</td>
<td>1</td>
<td>0.00</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>5</td>
<td>SIAS constrained</td>
<td>12.312</td>
<td>4</td>
<td>0.994</td>
<td>0.080</td>
<td>0.006</td>
<td>0.038</td>
</tr>
<tr>
<td>6</td>
<td>SPS constrained</td>
<td>12.731</td>
<td>4</td>
<td>0.993</td>
<td>0.082</td>
<td>0.007</td>
<td>0.040</td>
</tr>
<tr>
<td>7</td>
<td>BFNE constrained</td>
<td>13.763</td>
<td>4</td>
<td>0.993</td>
<td>0.087</td>
<td>0.007</td>
<td>0.045</td>
</tr>
<tr>
<td>8</td>
<td>DCS-Convivial &amp; SIAS constrained</td>
<td>1.839</td>
<td>2</td>
<td>1</td>
<td>0.00</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>9</td>
<td>DCS-Neg. Cope &amp; SIAS constrained</td>
<td>6.614</td>
<td>2</td>
<td>0.997</td>
<td>0.085</td>
<td>0.003</td>
<td>0.053</td>
</tr>
<tr>
<td>10</td>
<td>DCS-Intimate &amp; SIAS constrained</td>
<td>1.249</td>
<td>2</td>
<td>1</td>
<td>0.00</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>11</td>
<td>DCS-Convivial &amp; SPS constrained</td>
<td>0.582</td>
<td>2</td>
<td>1</td>
<td>0.00</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>12</td>
<td>DCS-Neg. Cope &amp; SPS constrained</td>
<td>6.947</td>
<td>2</td>
<td>0.996</td>
<td>0.088</td>
<td>0.004</td>
<td>0.046</td>
</tr>
<tr>
<td>13</td>
<td>DCS-Intimate &amp; SPS constrained</td>
<td>0.247</td>
<td>2</td>
<td>1</td>
<td>0.00</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>14</td>
<td>DCS-Convivial &amp; BFNE constrained</td>
<td>1.590</td>
<td>2</td>
<td>1</td>
<td>0.00</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>15</td>
<td>DCS-Neg. Cope &amp; BFNE constrained</td>
<td>7.546</td>
<td>2</td>
<td>0.996</td>
<td>0.093</td>
<td>0.004</td>
<td>0.049</td>
</tr>
<tr>
<td>16</td>
<td>DCS-Intimate &amp; BFNE constrained</td>
<td>1.200</td>
<td>2</td>
<td>1</td>
<td>0.00</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Note. All significant chi-square statistics are bold (p < .05). SA = Social Anxiety; CFI = Confirmatory Factor Index; RMSEA = Root Mean Square Error Approximation

*White and Black multigroup analyses*. Fit statistics of the multiple mediation model for White students and Black students are presented in Table 5. Baseline models were run for each group separately prior to running multigroup analyses; however,
consistent with multigroup analyses with gender, the first multigroup model in Table 5 provides global fit indices for the configural model due to the first two steps of invariance testing revealed ‘just identified’ models. Model 2 entailed conducting a multigroup analysis with all parameter estimates and error term correlations constrained equal across groups. As can be seen in Table 5, the global fit indices did not significantly change in Model 2, indicating model invariance across race.

Table 6

*Multigroup Analyses of the Multiple Mediation Model (Whites and Blacks)*

<table>
<thead>
<tr>
<th></th>
<th>Fit indices</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$\chi^2$</td>
<td>$df$</td>
<td>CFI</td>
<td>RMSEA</td>
<td>$\Delta$CFI</td>
</tr>
<tr>
<td>Model 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Configural, no constraints</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Model 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fully constrained</td>
<td>84.399</td>
<td>66</td>
<td>.986</td>
<td>.030</td>
<td>-.024</td>
</tr>
</tbody>
</table>

Note. SA = Social Anxiety; CFI = Confirmatory Factor Index; RMSEA = Root Mean Square Error Approximation
CHAPTER IV – DISCUSSION

The current study utilized the biopsychosocial model of social anxiety and problematic drinking proposed by Buckner and colleagues (2013) to examine the mediating role of drinking context on the relationship between three dimensions of social anxiety and problematic and safe drinking patterns. As an extension of the self-medication hypothesis (Carrigan & Randall, 2003), it is important to consider the multiple dimensions of social anxiety to determine if certain dimensions result in the utilization of alcohol to alleviate negative affect. Considering that the college environment is conducive to alcohol consumption and students with social anxiety experience elevated symptomatology in social situations, it is important to identify which aspects of the college environment may be more likely to trigger alcohol use as a means of coping with negative affect. Thus, the current study tested a larger, multiple mediation model that included three dimensions of social anxiety, three drinking contexts, three problematic and three safe drinking behaviors. Overall, it appears that students who are more focused on how they are being perceived by their peers (i.e., more cognitive symptoms of social anxiety) are engaging in the most problematic drinking patterns with a focus on reducing their social anxiety symptoms in social drinking settings.

Hypothesis 1a and 2a related to the direct relationship between interaction- and performance-related social anxiety (i.e., SIAS and SPS, respectively), alcohol-related behaviors and the mediating role of drinking context to examine the more commonly used social anxiety dimensions on drinking behaviors. It was predicted in hypothesis 1a that interaction- and performance-related social anxiety would be positively related to
harmful drinking and alcohol-related negative consequences, negatively related to serious harm reduction PBS and alternatives to drinking strategies, and unrelated to alcohol consumption PBS and controlled consumption PBS. It was predicted in hypothesis 2a that personal-intimate and negative coping drinking contexts would significantly mediate each of these direct relationships. However, these hypotheses were not supported. Although the current findings are inconsistent with previous literature regarding the relationship that performance- and interaction-related social anxiety have on alcohol-related outcomes (Ham & Hope, 2006; Terlecki et al., 2015; Villarosa, Madson, et al., 2014), one of the major advantages of using a structural equation model framework is the ability to examine a larger model that incorporates all of the predictors, mediators, and outcome variables simultaneously. As a result, the shared variance across measures on alcohol-related outcomes is eliminated, which then allows for identification of whether each of the measures still predict drinking behaviors or, as is the case with the current study, a single measure comes out as a stronger predictor of drinking patterns among college students. Importantly, and consistent with previous literature, the performance- and interaction-related social anxiety measures were independently correlated with each of the alcohol-related outcomes, except alcohol consumption (e.g., Schry & White, 2013). Thus, the current analysis may have allowed for a clearer picture of which social anxiety symptoms are most predictive of problematic drinking patterns; however, additional research is needed to confirm that role of cognitive symptoms above and beyond past literature supporting the performance- and interaction-related social anxiety symptoms.
While the predicted mediational relationship between performance- and interaction-related social anxiety and alcohol-related outcomes was contrary to research by Terlecki and colleagues (2015), some key differences in the current study may better explain the lack of consistent findings. Specifically, the current study 1) incorporated the fear of negative evaluation into the model, 2) examined each dimension of social anxiety on a continuum rather than grouping participants into high versus low social anxiety groups, and 3) included safe drinking behaviors into the conceptualization of drinking patterns among college students. Further, and similar to explanations noted regarding the lack of direct relationship between performance- and interaction-related social anxiety and the problematic and safe drinking behaviors, it may be the examination of the larger measurement model that includes three separate dimensions of social anxiety provides a clearer understanding of which aspects of social anxiety may be most predictive of problematic drinking patterns. In addition, it may be that students who reported more fear of negative evaluation also endorsed a number of performance- and interaction-related social anxiety symptoms. Thus, it may be the combination of social anxiety symptoms that contributes to more problematic drinking patterns compared to students who experience only performance- or interaction-related social anxiety.

Hypothesis 1b and 2b related to the direct relationship between evaluation fear-related social anxiety (i.e., BFNE) and alcohol-related behaviors and the mediating role of drinking context to examine the more novel social anxiety dimension on drinking behaviors. It was predicted in hypothesis 1b that evaluation fear-related social anxiety (i.e., BFNE) would be positively related to harmful drinking and alcohol-related negative
consequences, negatively related to controlled consumption PBS, serious harm reduction PBS and alternatives to drinking strategies, and unrelated to alcohol consumption. This hypothesis was partially supported such that students with more fear of negative evaluation reported more harmful drinking and alcohol-related negative consequences, fewer controlled consumption and serious harm reduction PBS. Interesting, and contrary to predictions, these students also reported more alcohol consumption, and fear of negative evaluation was unrelated to alternatives to drinking strategies. It was predicted in hypothesis 2b that drinking context would significantly mediate each of these direct relationships. This hypothesis was also partially supported such that students drinking in situations with a focus on alleviating their negative emotional experiences explained each of these direct relationships.

The primary purpose for including evaluation fears into the current model is the lack of examination of this construct along with performance- and interaction-related social anxiety dimensions simultaneously to determine if any dimension may be more predictive of problematic drinking patterns among college students. Further, and consistent with limitations reported by Mattick and Clarke (1998), the performance- and interaction-related social anxiety measures lack items focused on the cognitive vulnerabilities, which others have identified as the cornerstone of social anxiety disorder (Clark & Wells, 1995). As a result, current literature on the relationship between social anxiety and drinking patterns of college students may be missing a critical component for prevention and intervention efforts across campuses.
Extant literature predominantly supports the current finding that fear of negative evaluation significantly predicted problematic drinking behaviors (e.g., Clerkin, Werntz, Magee, Lindgren, & Teachman, 2014). While limited, most researchers have found that students who report more fear of negative evaluation also report more hazardous drinking and alcohol-related negative consequences (Morris et al., 2005; Stewart et al., 2006); however, the relationships fear of negative evaluation has with alcohol consumption have been less clear with most researchers finding no relationship (e.g., O’Grady, Harman, Gleason, & Wilson, 2012). Specifically, and contrary to predictions, fear of negative evaluation positively predicted alcohol consumption in the current study. While most researchers have found that students with social anxiety appear to drink less (via quantity and frequency) than their less socially anxious counterparts (e.g., Schry & White, 2013), some researchers have recognized how different aspects of social anxiety may be more predictive of drinking behavior, including typical alcohol consumption (Morris et al., 2005). For example, Lewis and O’Neill (2000) found evaluation-related social anxiety symptoms predicted more alcohol consumption, and Tomlinson, Cummins, and Brown (2013) found that while fear of negative evaluation was related to drinking onset among adolescents, those who reported more social avoidance-related social anxiety symptoms were unrelated to drinking behavior. Thus, it appears that Schry and White’s (2013) meta-analysis encompassed articles that predominantly capture the social avoidance and distress, or behavioral and physiological dimensions of social anxiety. While their meta-analysis is comprehensive of the college student literature on the social anxiety-alcohol use relationship, it also reflects the potential benefit of including the cognitive dimension
of social anxiety. In fact, Rapee and Heimberg (1997) identified fear of negative evaluation as the construct that indicates whether individuals do or do not have social anxiety disorder.

In support of hypothesis 2b negative coping drinking context significantly mediated the positive relationship that fear of negative evaluation had with the three problematic drinking behaviors and two of the safe drinking behaviors (i.e., controlled consumption and serious harm reduction PBS). In line with the biopsychosocial model of social anxiety and alcohol use disorders (Buckner et al., 2013), students with more fear of negative evaluation who are drinking to alleviate negative affect are reporting more problematic and less safe drinking behaviors. Further, extensive research has identified coping drinking motives (i.e., drinking to reduce negative affect), a similar construct to negative coping drinking contexts, as a significant mediator in the relationship between social anxiety and problematic drinking patterns (e.g., Stewart et al., 2006). Thus, students who are more focused on how they are viewed by their peers may be consuming more alcohol in social settings because it is seen as a normative behavior (Villarosa, Kison, Madson, & Zeigler-Hill, 2016), while also discovering that alcohol may help to alleviate these students heightened concerns about how they are being viewed by others.

To date, only a few researchers have incorporated fear of negative evaluation into their conceptualization of social anxiety as it relates to alcohol use (e.g., Norberg et al., 2009). However, these researchers used these three dimensions (i.e., performance-, interaction, and evaluation fear-related social anxiety) to categorize students into high versus low social anxiety groups. As the first study to examine these dimensions of social
anxiety on a continuum, it is important to note that the cognitive vulnerabilities common
among students with social anxiety plays a larger role on their drinking patterns
compared to the behavioral dimensions of social anxiety.

Another novel aspect of this project was to examine the gender and racial
differences in this multiple mediation model. Specifically, hypotheses 3a gender
differences were predicted the; however, no specific predictions were made due to
inconsistencies in the literature regarding gender differences when examining the
relationship between social anxiety and college student drinking patterns (e.g., Norberg et
al., 2010; Villarosa, Madson, et al., 2014). However, hypothesis 3a was not supported.
While the current findings are consistent with some previous literature (e.g., Villarosa,
Moorer, et al., 2014), the lack of gender differences is surprising considering females
report more social anxiety, and males tend to engage in problematic and less safe
drinking behaviors (Lawrence, Abel, & Hall, 2010). A key difference in the current study
is that social anxiety dimensions were examined on a continuum. Also, fear of negative
evaluation was the only predictor of problematic drinking patterns, and it has been noted
that lack of gender differences exist on the BFNE (Carleton et al., 2006). Thus, it may be
that males and females differ based on behavioral or physiological dimensions of social
anxiety rather than cognitive dimensions. However, the current study did not include a
measure of specifically physiological anxiety symptoms, which may lend to the lack of
gender differences (e.g., Stewart, Zvolensky, Eifert, 2001).

Although epidemiological researchers have found the gender gap is narrowing on
frequency of daily drinking and binge drinking (Johnston et al., 2014), there may be
factors unique to the current sample that may help explain the current findings.

Considering the literature supporting the lack of gender differences (e.g., Villarosa, Madson et al., 2014; Villarosa, Moorer et al., 2014; Villarosa et al., 2016) and that current sample were students attending the same university, it may be that drinking rates differ in these students. For example, these student samples attend a university with a no alcohol policy on-campus. Thus, it may be the narrowing gender gap of drinking rates combined with a university that attempts to limit alcohol use that may contribute to the similar drinking levels across gender in the current study. Further, considering the lack of gender differences on each of the social anxiety measures, it may also be that other factors outside of social anxiety predict gender differences in college student drinking patterns. For example, it may be self-esteem (e.g., Zeigler-Hill, Stubbs, & Madson, 2013) or PBS use (e.g., Madson & Zeigler-Hill, 2013) that contributes to gender differences.

In hypothesis 3b, racial differences were expected in the multiple mediation model; however, no specific predictions were made due to the lack of previous research. Contrary to predictions, no racial differences were found. Although a novel component of the current study, this finding is surprising considering Whites are more likely to be diagnosed with social anxiety disorder than Blacks (Asaani et al., 2010), and White college students have reported more problematic drinking patterns compared to Black students (Madson & Zeigler-Hill, 2013). However, and in support of the current findings, Johnson, Price, Mehta, and Anderson (2012) found no differences in fear of negative evaluation between White and Black students. While both racial groups may experience
fears of negative evaluation, the focus that lends to their decision to consume alcohol may differ. Further, with data collected from a predominantly White university, it may be that the Black students in the current sample are consuming alcohol at similar rates as their White counterparts due to factors such as acculturation (i.e., identifying and adapting to the behaviors and attitudes of White college students; Abdullah & Brown, 2012). It may be important to include Black students from historically black colleges/universities (HBCU) when examining the social anxiety-alcohol outcomes relationship to better determine if racial differences exist, both between two different Black samples and in comparison with White students.

The current study has a number of implications for prevention and intervention efforts across college campuses. By examining students with varying levels of social anxiety and alcohol use patterns, it is important to consider how prevention efforts can be implemented to minimize the risk for these students to develop clinically significant social anxiety and alcohol-related issues during the college years. Geisner, Neighbors, Lee, and Larimer (2007) provided a detailed description of the three levels of prevention strategies originally outlined by the Institute of Medicine (1994) that can be beneficial to reduce the risk of mental health and associated substance use issues among college students. The three levels include universal prevention, which involves strategies geared toward an entire population regardless of risk, indicated prevention, which involves strategies geared toward a population that has shown signs of risk, and selective prevention, which involves strategies targeting subgroups of populations who have been
identified as at-risk. Thus, prevention strategies based on these three levels are presented below in light of the current study findings.

Across college campuses, one of the most common universal prevention strategies are social norming campaigns, which seeks to correct the common misperception of college students that problematic drinking is a normative, acceptable behavior, which as a result impacts their personal alcohol use (Fitzpatrick, Martinez, Polidan, & Angelis, 2016). Since students with more fear of negative evaluation are engaging in more problematic drinking behaviors, which is potentially due to their peers’ drinking behavior (Stewart et al., 2006), it may be important to modify these efforts by relaying more university-specific drinking norms. In line with current findings, indicated prevention strategies may consider co-occurrence of mental health and alcohol use among college students. For example, student life personnel can provide psychoeducation to college students regarding the cyclical nature of mental health and substance use issues, and emphasize that alcohol consumption is a common unhealthy coping strategy for negative emotional experiences (Carrigan & Randall, 2003). Further, providing students with healthier ways to manage their mental health issues, students with subclinical symptoms, such as those with more fear of negative evaluation, may be less likely to resort to alcohol use to manage their distress.

In terms of selective prevention strategies, students with more fear of negative evaluation may benefit from personalized normative feedback of their alcohol use. Specifically, specifying personalized feedback to injunctive norms (i.e., approval of drinking) rather than descriptive norms (i.e., beliefs of drinking) may be particularly
important for students with more social anxiety. Buckner and colleagues (2011) found that students with more social anxiety reported more alcohol-related problems if they had higher injunctive norms. Finally, students with more social anxiety may benefit from engaging in social events that do not involve alcohol. With the college years being a time of identity exploration (Arnett, 2000), student life personnel hosting activities for students with social anxiety to interact with their peers in a context that allows distraction (e.g., playing games) rather than avoidance (e.g., consuming alcohol) may foster more friendships and social confidence, and less evaluative concerns.

The current study also sheds light on a number of intervention strategies for students with social anxiety. First, brief motivational interventions such as the Brief Assessment and Screening Intervention for College Students (BASICS; Dimeff, Baer, Kivlahan, & Marlatt, 1999) have been shown to be less effective for students with social anxiety (Terlecki et al., 2012). Thus, some potentially beneficial modifications to BASICS tailored towards students with social anxiety include administering a mental health screening tool, providing personalized normative feedback geared toward injunctive norms of proximal reference groups (Terlecki et al., 2012), teaching PBS skills (i.e., those geared towards controlling consumption and reducing serious harm; Villarosa, Moorer, et al., 2014), and a booster session to address the cyclical nature of social anxiety and alcohol use disorders and highlight the cognitive vulnerabilities. It would be especially important that the focus of the booster session be to encourage students to engage in additional treatment to address their social anxiety symptoms.
In addition to the clinical implications, there are a number of future directions for research. With the current study revealing that the cognitive vulnerabilities of students with social anxiety predict more problematic drinking patterns, it is important to consider other cognitive-related factors that may be important among these students. For example, researchers have begun to examine the role of fear of positive evaluation in the conceptualization of social anxiety (Weeks, Heimberg, & Rodebaugh, 2008). In fact, Weeks (2015) found that fear of positive evaluation was unique to social anxiety, and a recent study by Howell, Buckner, and Weeks (2016) found fear of positive evaluation predicted alcohol-related negative consequences above and beyond fear of negative evaluation. Based on the poorer treatment outcomes for students with social anxiety (e.g., Terlecki et al., 2012), examining additional cognitive factors revolving around normative perceptions may better inform directions for prevention and intervention efforts. Specifically, it is important to determine if students with more fear of negative evaluation who are drinking in negative coping drinking contexts have more injunctive norms and/or resistance to peer influence, which may further explain their problematic drinking patterns.

Considering that negative coping drinking contexts appear to explain the link that evaluation fear-related social anxiety has with both problematic and safe drinking behaviors, it may be beneficial to modify a coping-related measure to capture coping with the five dimensions of social anxiety, as recommended by Buckner and colleagues (2013) in their biopsychosocial model. For example, the most recent drinking motives measure revised by Grant, Stewart, O’Connor, Blackwell, and Conrad (2007) breaks coping
motives down into coping with anxiety and depression. Using the instructions of the drinking motives measure, and identifying and selecting the most appropriate items to capture each of the five dimensions of social anxiety, researchers can better evaluate the biopsychosocial model and determine which symptoms are being alleviated through alcohol use.

Finally, considering previous researchers have noted demographic differences in the relationship between social anxiety and drinking behaviors (e.g., Norberg et al., 2010), future researchers may benefit from incorporating factors other than drinking contexts that may highlight gender and racial differences in drinking behaviors among students with social anxiety across college campuses. For example, including Black students from HBCU may shed light on the prevalence and differences of social anxiety and drinking patterns between Black students at HBCUs compared to predominantly White universities, as well as how these two racial groups compare to White college students. Also, incorporating factors related to societal influences (e.g., microaggressions, stereotype confirmation) may clarify if differences in social anxiety and associated drinking behaviors exist between racial groups. Further, Buckner and colleagues (2012) developed the Social Impression while Drinking Scale which combined items from the three social anxiety measures used in the current study with items related to alcohol-related expectancies to capture specific impressions students with social anxiety hold while drinking. It may be important to include this measure in future research to better highlight what impressions males and females, as well as different racial groups with social anxiety hold when drinking in social situations.
The current findings must be made in light of the study limitations. First, according the Buckner and colleagues (2013) biopsychosocial model of social anxiety and alcohol use disorders, the researchers highlight biological influences and outlined five dimensions of social anxiety (i.e., physiological arousal, evaluation fears, low positive affect, perceived social deficits, and social avoidance). However, the current study failed to examine the biological component and only captured three of the five dimensions (i.e., physiological arousal, perceived social deficits, and evaluation fears, not social avoidance or low positive affect). Further, physiological arousal and perceived social deficits were captured in the two behaviorally-focused social anxiety measures (i.e., SIAS and SPS). While the SIAS and SPS have been the most frequently used measures in the college student drinking literature, it is important to examine separate measures of each social anxiety dimension to determine if fear of negative evaluation is in fact the strongest predictor of college students’ problematic drinking patterns. Thus, in order to best capture Buckner and colleagues proposed Biopsychosocial model of social anxiety and alcohol use disorders, future researchers could include questions related to family history of SAD and AUD (i.e., to capture the biological component), as well as measures such as the Anxiety Sensitivity Index (Reiss, Peterson, Gursky, & McNally, 1986), Positive and Negative Affect Schedule (Watson, Clark, & Tellegen, 1988), and Social Avoidance and Distress Scale (Watson & Friend, 1969) to capture the physiological arousal, low positive affect, and social avoidance dimensions of social anxiety, respectively.
Additional limitations of the current study include utilizing a cross-sectional design, collecting data from a single institution in the southeastern region of the United States, and collecting data from predominantly White females. Since cross-sectional designs entail collecting data at a single point in time, the current findings only allow examination of the relationships between constructs rather than causal implications. Also, collecting data from a single institution limits the generalizability of the current findings to college students in other regions of the United States. Finally, while the current sample demographics was representative of the institution, the current findings may not generalize to a more diverse demographics at other institutions. Thus, future researchers may benefit from conducting longitudinal designs (e.g., daily diary designs; Poikolainen, Podkletnova, & Alho, 2002) at multiple institutions across the United States with a focus on a more diverse sample of students.

Overall, it is important to consider the cognitive vulnerabilities specific to students with social anxiety in order to prevent the development of problematic drinking patterns. Although experiencing social anxiety symptoms place students at a greater risk for developing an AUD, it appears that those students with more fear of negative evaluation are particularly susceptible to more problematic and fewer safe drinking behaviors. In addition to viewing alcohol consumption as a normative behavior, these students appear to be engaging in problematic drinking patterns with a focus on alleviating their fears. Thus, prevention and intervention efforts should consider how to address these maladaptive cognitions into campus-wide campaigns and brief alcohol
interventions with the goal to prevent the development of clinically significant social anxiety and/or alcohol use.
REFERENCES


anxiety and perceived drinking norms. *Psychology of Addictive Behaviors*, 26, 917-923.


