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Caffeinated Alcohol Use and Anxiety Symptoms Among College Students

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CAFFEINATED ALCOHOL USE AND ANXIETY SYMPTOMS

AMONG COLLEGE STUDENTS

by

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ABSTRACT

CAFFEINATED ALCOHOL USE AND ANXIETY SYMPTOMS AMONG COLLEGE STUDENTS

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Recently, the combination of alcohol and caffeine (i.e., caffeinated alcohol) has been growing in popularity among college students. Consumption of caffeinated alcohol has been shown to result in negative consequences (e.g., required medical attention, engaged in driving and sexual risk behaviors). It may be important to investigate the potential risk this may have on students with mental health issues, such as those with anxiety symptoms, as they may already be at heightened risk for substance-related problems. Consequently, the purpose of this study was to explore the relationship between anxiety and caffeinated alcohol use in a college student sample. The aims were to: (1) determine the relationship between caffeinated alcohol use and anxiety symptomology; (2) examine anxiety as a moderator of caffeinated alcohol use and alcohol-related problems, risk behaviors (i.e., driving and sexual risks), and other substance use; (3) examine avoidance coping as an mediator in the relationship between anxiety and caffeinated alcohol use and problems; and (4) explore the relationship between anxiety and reasons for consuming caffeinated alcohol. Typical caffeinated alcohol consumers ($N = 231$; 64.9% female) participated in the present study. Findings indicated that anxiety was unrelated to caffeinated alcohol consumption. Anxiety did not influence the relationship between caffeinated alcohol use and alcohol-related problems, risky behaviors, or smoking. Anxiety moderated the relationship between caffeinated

alcohol use and stimulant drug use, such that higher anxiety predicted a negative relationship between caffeinated alcohol use and stimulant drug use. Anxiety also moderated the relationship between caffeinated alcohol use and psychedelic drug use; however, there was no significant association for those higher in anxiety. Avoidance coping explained the relationship between anxiety and caffeinated alcohol use and problems. Anxiety was related to greater likelihood of using caffeinated alcohol for the purposes of (1) feeling more physical vigor and (2) reducing fear, anxiety, or avoidance. Anxiety was related to a reduced likelihood of using caffeinated alcohol because of a taste preference. The general lack of significant findings may suggest a need to focus on potential expectancies, motivations, and context effects that underline caffeinated alcohol use and consequences in the general college student population.

This thesis is dedicated to my parents, Richard and Lorraine Linden.

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER I

INTRODUCTION

Hazardous alcohol consumption is a significant health problem on many college campuses (Wechsler, Lee, Kuo, & Lee, 2000). Along with consuming large quantities of alcohol, many college students also have started to consume large quantities of energy drinks (Arria, Caldeira, Kasperski, Vincent, Griffiths, & O'Grady, 2011). Energy drinks, such as Red Bull, Monster, and Rockstar, contain excessive amounts of caffeine. The consumption of energy drinks has been shown to lead to many problems, including blackout experiences (Arria et al., 2011), other substance use, and risk behaviors (Miller, 2008).

High frequency energy drink users are more than twice as likely as low and non-frequency energy drink users to meet criteria for alcohol dependence (Arria et al., 2011). This may be due, in part, to the fact that in the last few years, college students have been frequently mixing alcohol (a depressant) with caffeine (a stimulant). One study demonstrated that, even after controlling for the level of alcohol consumption, individuals who consumed alcohol with caffeine experienced greater alcohol-related problems (O'Brien, McCoy, Rhodes, Wagoner, & Wolfson, 2008). Further, consumption of alcohol with caffeine is associated with increased binge drinking (Woolsey, Waigandt, & Beck, 2010), driving while intoxicated (Thombs, O'Mara, Tsukamoto, Rossheim, Weiler, & Merves, et al., 2010; Thombs, Rossheim, Barnett, Weiler, Moorhouse, & Coleman, 2011), and sexual risk behaviors (O'Brien et al., 2008).

Given the potential higher risk connected to caffeinated alcohol use, an examination of how such substance use impacts various segments of the college student

population is warranted. One such group of students is those who experience psychological difficulties like anxiety problems. Individuals higher in anxiety have been found to consume more alcohol and have more alcohol-related problems than individuals lower in anxiety (Bolton, Cox, Clara, & Sareen, 2006; Robinson, Sareen, Cox, & Bolton, 2009). The extent to which consumption of caffeinated alcohol might be a problem in this population is unclear. Further, little research has focused on factors that may explain such a relationship.

Energy Drinks

Energy drinks have been rapidly increasing in sales and popularity in the last decade (Arria et al., 2011; O'Brien et al., 2008). A national study reported that the largest demographic consuming energy drinks are young adults between ages 18-24 years (34% of young adults; Mintel, 2007). Energy drinks can contain 50 to 505 mg of caffeine per can, relative to coffee, which typically contains 77 to 150 mg of caffeine (Griffiths, Juliano, & Chausmer, 2003). The most popular energy drinks are Red Bull (with 80 mg of caffeine/can), Monster (with 160 mg/can), and Amp (74 mg/can; Arria et al., 2011). Their high quantity of caffeine makes them particularly popular among young people (e.g., college students), as they are marketed to enhance physical and mental performance (Howard & Marczinski, 2010).

Supporting reasons for their popularity, researchers found that 67% of users consumed energy drinks due to a lack of sleep, 65% used to increase their energy, 54% used energy drinks to mix with alcohol while partying, and 17% used energy drinks to cure a hangover (Malinauskas, Aeby, Overton, Carpenter-Aeby, & Barber-Heidal, 2007). In regards to frequency of use, one study found that 39% of participants (mostly men)

consumed an energy drink in the past month (Miller, 2008b). Arria and colleagues (2011) found that 52.6% of their sample consisted of low-frequency energy drink users (used energy drinks occasionally or monthly) and 13% high-frequency users (used energy drinks weekly or daily).

Researchers have examined energy drink consumption to assess if the expectations of using these energy drinks hold in an experimental context. One experimental study examined the physiological effects of energy drinks, such as its effect on reaction time (Howard & Marczinski, 2010). It was found that the effects of energy drinks depend on the amount consumed. In particular, participants who consumed lower dosages of energy drinks as compared to a control or higher dosages had decreased reaction times, increased self-ratings of stimulation and decreased self-ratings of fatigue. This study suggests that those who are consuming energy drinks not only feel more alert, but actually are more physiologically alert as well.

Alcohol Use

Alcohol is another commonly used substance on college campuses. Hazardous alcohol consumption is a severe health problem among college students. In particular, there is a high prevalence of alcohol use disorders (AUDs) in this population (Wu, Pilowsky, Schlenger, & Hasin, 2007). A reported 40% of students engage in heavy drinking or "binge drinking" (O'Malley & Johnston, 2002; Wechsler, Dowdall, Maenner, Gledhill-Hoyt, & Lee, 1998; Wechsler et al., 2000). Binge drinking is most recently defined as consuming four or more alcoholic drinks in two hours for women and five or more drinks in two hours for men (NIAAA, 2004). Binge drinking frequency is common among college students at large (Wechsler et al., 2000). In particular, students binge

drink for the purposes of getting drunk. On average, students reported getting drunk at least three times in the past month (Wechsler et al., 2000).

Caffeinated Alcohol

Prevalence. As alcohol and caffeine are both prevalent on college campuses, it is not surprising that the mixture of the two is also becoming increasingly common. Caffeinated alcohol consists of self-mixed drinks in which alcohol (e.g., vodka) and a caffeinated drink (e.g., Red Bull) are combined (O'Brien et al., 2008). Premixed beverages that contain alcohol and caffeine, such as P.I.N.K, Four Loko, Sparks, and Joose (Simon & Mosher, 2007) were deemed illegal by the Federal Drug Administration in December 2010 ("Update regarding our reformulated products," 2010). Consuming self-mixed caffeinated alcohol is becoming prevalent on college campuses (Ferreira, de Mello, & Formigoni, 2004; Kapner, 2008; O'Brien et al., 2008).

A number of studies have examined the prevalence of caffeinated alcohol use on college campuses. In a study of 4,271 college students, O'Brien and colleagues (2008) examined the prevalence of self-mixed caffeinated alcohol as well as the likelihood of experiencing problems from consuming these beverages. It was found that 24% of college student drinkers consumed self-mixed caffeinated alcohol (e.g., Red Bull with vodka or Jager Bombs) in the past month. In a Brazilian sample of 136 college students, 76% reported regularly using self-mixed caffeinated alcohol (Ferreira et al., 2004). Those who were male, white, young, athletes, and fraternity or sorority members were more likely to consume at least one self-mixed caffeinated alcohol drink in the past 30 days (O'Brien et al., 2008). In a study examining the prevalence of and reasons for energy drink consumption among college students, 54% of drinkers used energy drinks to

mix with alcohol (Malinauskas et al., 2007). Miller (2008b) examined self-mixed

caffeinated alcohol usage in undergraduate students. It was found that 26% reported

consuming alcohol mixed energy drinks at least once (Miller, 2008). Similar to O'Brien

and colleagues' (2008) study, men were more likely to consume self-mixed caffeinated

alcohol in the past month than women, and white students were more likely to consume

than black students (Miller, 2008). Overall, these studies showed that caffeinated alcohol

is widely used on college campuses and typically consumed in high dosages.

 Reasons for consumption of caffeinated alcohol. As caffeinated alcohol has

made significant gains in popularity, several researchers have investigated the reasons

behind the consumption of these beverages among college students. Generally, research

has found that energy drinks mask the taste of alcohol and reduce the feelings of

drunkenness when combined, and together these drinks promote good feelings and

lowered behavioral inhibitions (Ferriera et al., 2004; Malinauskas et al., 2007;

Marczinski, 2011; Marczinski & Fillmore, 2006; O'Brien et al., 2008). O'Brien and

colleagues (2008) found that 55% of the sample consumed alcohol mixed energy drinks

to hide the flavor of alcohol, 15% consumed to feel less drunk, 5% consumed to so that

they could drink more alcohol without appearing drunk, and 7% consumed so that they

would not get a hangover. Participants also responded with various responses such as "It

was what was being served at a party", "It was the only mixer available" and "That's how

you make Jager Bombs" (O'Brien et al., 2008). In another study, a sample of Brazilian

college students revealed that 38% used alcohol mixed energy drinks to increase

happiness, 30% reported experiencing euphoria, 27% reported feeling less behaviorally

inhibited, and 24% reported more physical energy (Ferreira et al., 2004). More recent

studies have indicated that college students reported using caffeinated alcohol to reduce sedative effects (Marczinski, 2011). It was suggested that without experiencing sedation, college students may lack cues to stop drinking.

The reported popularity of mixing energy drinks and alcohol due to the subjective feelings experienced while consuming such beverages is an important concern (Malinauskas et al., 2007; O'Brien et al., 2008). Marczinksi and Fillmore (2006) conducted an experimental study to detect the effects of alcohol and caffeine on cognitive performance and subjective feelings of intoxication. In this study, participants performed various cognitive dual-tasks measuring reaction time and errors performed after providing them an undisclosed substance (i.e., either alcohol, caffeine, or alcohol with caffeine). Researchers found that caffeine reduces the perceiver's feeling of drunkenness without actually reducing alcohol-related impairment when consuming these mixed drinks (Marczinski & Fillmore, 2006). Participants reported feeling less intoxicated as compared to those who drank alcohol alone, though they were making errors in the task, thus displaying impaired performance. Curry and Stasio (2009) also found in a double-blind experimental study that participants who consumed caffeine plus alcohol had worse cognitive functioning in language performance and visual-spatial/constructional indexes.

Another experimental study administered either alcohol, an energy drink, or an energy drink mixed with alcohol without the participant's knowledge of which type of drink they were consuming (Ferreira, de Mello, Pompeia, & de Souza-Formigoni, 2006). Participants who consumed a mixture of Red Bull and vodka reported fewer subjective feelings of headache, dry mouth, and motor coordination as compared to those who drank alcohol alone. However, though participants perceived fewer feelings of drunkenness,

their actual measured motor coordination and visual reaction time deficits were not reduced (Ferreira et al., 2006). Overall, these experimental studies demonstrated that though users are consuming alcohol mixed energy drinks to feel less drunk, their physical symptoms of drunkenness are not actually reduced (Ferreira et al., 2006; Marczinski & Fillmore, 2006).

Alcohol and Caffeine Problems

The consumption of alcohol and caffeine among college students, whether alone or in combination, has been shown to relate to negative consequences in several areas of functioning, including an increase in adverse physiological effects, social-interpersonal problems, safety, risk behaviors (i.e., sexual risk taking, impaired driving), and substance abuse (e.g., Arria et al., 2011; Kerrigan & Lindsey, 2005; Malinauskas et al., 2007; O'Brien et al., 2008; Wechsler, Davenport, Dowdall, Moeykens, & Castillo, 1994).

Alcohol-related problems. Engaging in risky alcohol consumption can predict many adverse consequences for college students (Hingson, Heeren, Winter, & Wechsler, 2005; Wechsler et al., 1994). The prevalence of alcohol-related problems has increased among college students in broad categories of educational, social-interpersonal, safety, and health problems (Wechsler et al., 2000). Specifically, these problems include missing class, blacking out, having unprotected sex, damaging property, getting into trouble with the authorities, requiring medical treatment for alcohol misuse, driving while intoxicated, and getting injured (Wechsler et al., 2000). Heavy alcohol use among students who are either abstainers or who do not engage in binge drinking are also at risk for experiencing the negative effects of alcohol ("secondhand effects"; Wechsler et al., 2000). Non-binging students residing on campuses with peers who heavily binge puts

them at a higher risk of being assaulted, experiencing unwanted sexual activity, being humiliated, kept from studying, and awakened by drinkers than those residing on campuses with lower binge drinking rates (Wechsler et al., 2000).

Caffeine-related problems. Caffeine, a central nervous system (CNS) stimulant as well as an adrenal medulla stimulant, is associated with secreted hormones of stress, emotion, and arousal (see Sawyer, Julia, & Turin, 1981 for a review). An experimental study found that ingestion of caffeine increases symptoms of anxiety, depression, and hostility (Veleber & Templer, 1984). In addition to caffeine producing real physiological effects, caffeine also appears to provide similar expectancy effects. When provided with an ostensibly caffeinated placebo, participants perceived an increase in alertness and clarity of thought (Christensen, White, Krietsch, & Steele, 1990). Page (1987) also found that caffeine drinkers are more likely to perceive that these drinks increase energy and relaxation, and generally make them feel better.

Though the energizing effects of caffeine may be temporarily beneficial, repeated use of caffeine can lead to adverse health consequences (i.e., feelings of anxiety, depression, impaired sleep, hypertension, and headaches; Greden, Fontaine, Lubetsky, & Chamberlain, 1978; Watson, 1988), greater drug use of all types (Greden et al., 1978), and even death (Kerrigan & Lindsey, 2005). Consuming even 100 mg of a caffeinated beverage could produce symptoms of Caffeine Intoxication, which is defined in the DSM-IV-TR as nervousness, anxiety, restlessness, and insomnia (American Psychiatric Association, 2000).

More specific to energy drinks, one can experience negative consequences, such as jolts and crashes, headaches, and heart palpitations (Malinauskas et al., 2007). Arria

and colleagues (2011) found that those who consumed energy drinks at a higher

frequency also drank alcohol more frequently, had more blackout experiences, and

missed class more often than lower frequency energy drink consumers. Miller (2008)

found similar results among energy drink consumers, such that they engaged more in

marijuana use, sexual risk-taking, fighting, not using a seatbelt, smoking, and using

drugs. In their study of 1,060 college students, Arria and colleagues (2010) found that

second and third year energy drink consumers were more likely to have used other drugs

in the past year, including the use of nonmedical prescription stimulants and prescription

analgesics. Energy drink users also were more likely to have used tobacco in comparison

to nonusers. High frequency energy drink users are over twice as likely as low and non-

frequency energy drink users to meet the criteria for alcohol dependence (Arria et al.,

2011). This may be due in part to the fact that in the last few years, college students have

been frequently mixing alcohol (a depressant) with caffeine (a stimulant), leading to

numbers alcohol-related problems (O'Brien et al., 2008).

Caffeinated alcohol-related problems. As independent use of caffeine and

alcohol have been linked to numerous problems and risk behaviors, the combination of

the two substances also have been shown to result in negative consequences (O'Brien et

al., 2008; Thombs et al., 2010; Thombs et al., 2011; Woolsey et al., 2010). The dangers

of consuming caffeinated alcohol have recently gained a great deal of attention in the

popular media. For example, , nine college students at Central Washington University

were hospitalized after a night of partying with the caffeinated alcohol beverage, Four

Loko, also known as "blackout in a can" (Duke, 2010). The students were not given any

other drugs aside from willingly consuming Four Lokos, which contains caffeine (more

than a typical amount in a cup of coffee) mixed with alcohol (similar to the amount in four or five beers; Duke, 2010). Reportedly, some even mixed the already mixed caffeinated alcohol beverage with additional vodka (Duke, 2010). A 20-year-old died after becoming highly drunk and wired after consuming three or more cans of Four Loko, causing him to become erratic and accidentally shoot himself (Canning, 2010). Though the company who manufactures Four Loko, Phusion Projects, removed the ingredient of caffeine (Canning, 2010), other self-mixed drinks such as Red Bull and vodka are still used. Using alcohol self-mixed energy drinks have been found to result in numerous negative consequences (O'Brien et al., 2008; Thombs et al., 2010).

A few studies have reported the alcohol-related problems experienced from using self-mixed and pre-mixed alcohol energy drinks (O'Brien et al., 2008; Thombs et al., 2010; Thombs et al., 2011; Woolsey et al., 2010). In particular, O'Brien and colleagues (2008) found that consuming self-mixed drinks constituted high-risk drinking irrespective of amount used. In this large sample, college students who consumed alcohol mixed energy drinks drank more on one occasion, had twice as many heavy drinking days in the past month, and twice as many episodes of reported drunkenness. Students who consumed self-mixed caffeinated alcohol consumed 36% more drinks in one occasion (8.3 drinks) than those who did not consume alcohol mixed energy drinks (6.1 drinks). These students were also more likely to get hurt and require medical attention compared to students who only drank alcohol.

Another study examined self-mixed caffeinated alcohol use and negative consequences among college student athletes (Woolsey et al., 2010). Nearly 40% of their sample consumed self-mixed alcohol and energy drinks and 78.6% used alcohol in

the past year. Those who consumed both alcohol and energy drinks simultaneously consumed more alcohol and binge drank more often than those who consumed only alcohol. Those who consumed only alcohol consumed an average of 9.8 drinks on the highest drinking occasion compared to those who consumed alcohol mixed energy drinks (18 drinks, nearly twice as many). Consistent with participants in O'Brien and colleagues' (2008) non-athlete study, those who consumed alcohol mixed energy drinks consumed more alcohol per occasion, binge drank more often, drank more alcohol on one occasion, and used more than twice the amount of alcohol in the past year as compared to those who consumed only alcohol. Woolsey et al. (2010) also asked participants to predict how they would physiologically feel in response to consuming alcohol mixed energy drinks as compared to alcohol alone. Participants expected that they would be more likely to act aggressively, not sleep well, be nervous or jittery, and experience a rapid heartbeat more than when consuming alcohol alone.

Risk Behaviors

As consumers of caffeinated alcohol tend not to feel the effects of alcohol, research has shown that this lack of awareness of actual drunkenness has made individuals more likely to engage in risky behaviors, such as driving under the influence and engaging in risky sexual behaviors. Specifically, in terms of driving behaviors, O'Brien and colleagues (2008) found that college students who consumed alcohol mixed energy drinks were significantly more likely to drive in a car with someone who was intoxicated than individuals who did not consume alcohol mixed energy drinks. Researchers suggested that alcohol mixed energy drinks may not only impair their own level of intoxication, but also how intoxicated they perceive others (i.e., a driver). It has

also been found that participants predicted being more likely to drive a car after consuming alcohol mixed energy drinks as compared to drinking alcohol alone (Woolsey et al., 2010). A more recent study found that caffeinated alcohol users were more likely to engage in risky behaviors (e.g., risky driving), even after controlling for their risk-taking tendency (Brache & Stockwell, 2011).

A field study of 1,255 exiting patrons at a bar investigated the odds of leaving the bar intoxicated and the intention to drive afterwards (Thombs et al., 2010). Researchers found that 6.5% had consumed alcohol mixed energy drinks in the past 12 hours, 6.6% reported consuming energy drinks and alcohol separately, and 86.4% consumed only alcohol. Those who consumed alcohol mixed energy drinks were more likely to leave a bar intoxicated in comparison to someone who consumed alcohol alone after controlling for the consumption of energy drinks not mixed with alcohol. Specifically, those who consumed alcohol mixed energy drinks exited the bar later in the evening, drank more drinks total, consumed more alcohol, and subsequently had higher blood alcohol content than those who only drank alcohol or consumed energy drinks and alcohol not mixed together. Even more serious, those who consumed alcohol mixed energy drinks were over 4 times more likely to intend to drive after drinking. These results further support that caffeine in energy drinks may be reducing the user's perceived impairment from alcohol, and thus, increasing the likelihood that the consumer perceives their motor coordination as unimpaired (Thombs et al., 2010).

Thombs and colleagues (2011) replicated these findings of alcohol mixed energy drinks in another field study where, instead of examining consumers of energy drinks mixed with alcohol, researchers examined those who consumed soda-caffeinated mixed

alcohol drinks. Nearly 5% of the 481 participants consumed alcohol mixed energy drinks, and a much larger 25.8% of the sample consumed cola-caffeinated alcoholic beverages. Researchers demonstrated that these types of consumers also left the bar more intoxicated than those who consumed only alcohol. They also found that the quantity of caffeinated alcohol consumed had a positive association with intoxication, such that ingesting caffeine (regardless if energy drink or soda) has a dose-response relationship with intoxication. In addition, the risks from consuming these cola beverages were similar to the risks experienced by those consuming alcohol mixed energy drinks, as in their previous field study (Thombs et al., 2010, 2011). Overall, results from these studies indicate that intoxication level may be similar regardless of type of alcohol mixed caffeinated beverages, and the use of either caffeine mixer may potentially lead to the same risky driving behaviors.

Limited research has examined associations between alcohol mixed energy drink consumption and sexual risk behavior in college students. One study, however, found that college students who used alcohol mixed energy drinks were at greater risk of taking or being taken advantage of sexually (O'Brien et al., 2008). Regarding the risk of other substance use, only one study examined the relationship between caffeinated alcohol use and additional substance use (Brache & Stockwell, 2011). Researchers found that caffeinated alcohol consumers were more likely to use stimulants (i.e., cocaine, amphetamines), but other stimulants (e.g., cigarettes) or drugs (e.g., ecstacy, heroin) were not explored. Studies examining energy drinks have found a link to marijuana use and other illegal drug use (Miller, 2008) as well as tobacco use (Arria et al., 2010).

Problem Behavior Theory (Jessor & Jessor, 1977) suggests that drinking,

marijuana use and sexual behaviors may constitute a syndrome, such that engaging in one

risk behavior may be linked to a co-occurrence with other substance use or problem

behaviors. As discussed by Woolsey and colleagues (2010), marijuana is linked to

alcohol and other drug use. Miller and Carroll (2006) found that the stimulants in energy

drinks are similar to the other drug stimulants, which similarly affect the

neurotransmitters in the brain. Potentially, the use of energy drinks (Arria et al., 2010;

Miller, 2008) or caffeinated alcohol could be related to additional substance use and risk

behaviors.

Anxiety

As caffeinated alcohol, a potentially dangerous substance linked to behavioral

problems, is becoming increasingly popular on college campuses, the possible risk this

may have on students with symptoms of mental disorders may be of considerable

importance. In particular, individuals with trait anxiety, a generally stable state of

constant anxiety, have been found to consume more alcohol and experience more

alcohol-related problems (Bolton et al., 2006; Robinson et al., 2009). Therefore, this

population may be a particularly at-risk for experiencing the adverse effects of

caffeinated alcohol.

One of the most prevalent types of anxiety disorders among college students

(Eisenberg, Gollust, Golberstein, & Hefner, 2007) and in the United States population

(Kessler, Chiu, Demler, & Walters, 2005) is generalized anxiety disorder (GAD).

Approximately 3% of the US population reports experiencing GAD and 32.3% of these

cases are severe. In a college population, 4.2% of undergraduates and 3.8% of graduate

students met the criteria for GAD (Eisenberg et al., 2007).

Symptoms of GAD may include muscular tension, trembling, twitching, and shakiness (American Psychiatric Association [APA], 2000). Individuals with GAD are persistently anxious, have somatic tension, and worry excessively, which can be highly debilitating, interfering with everyday life conditions (APA, 2000). Worry is typically the central feature of the disorder, spreading across many domains (e.g., work, family, health; Turk & Mennin, 2011). This excessive worry is difficult to control, and is related to sleep disturbance, dysthymia, and major depressive disorder. Approximately 86% of individuals with GAD worry more than 50% of the time they are awake (Sanderson & Barlow, 1990). Eighty-two percent of individuals with GAD have role impairment (e.g., divorce, unemployment; Wittchen, Zhao, Kessler, & Eaton, 1994). The high prevalence rates and significant role and everyday life impairment emphasizes the importance of focusing on this population (Eisenberg et al., 2007).

Anxiety and alcohol. GAD has been found to be comorbid with substance-related disorders, such that the anxiety disorder precedes the substance abuse (APA, 2000). Consumption of alcohol may be a particular concern among those with poor mental health functioning, especially among individuals with anxiety (Bolton, et al., 2006; Robinson et al., 2009). Individuals with anxiety may attempt to reduce these symptoms with alcohol or drugs (Bolton et al., 2006). Though consuming alcohol may perceptively reduce symptoms temporarily, consuming alcohol to manage symptomotology may develop into a primary means of coping, potentially leading to greater alcohol-related consequences, such as physical dependence (Bolton et al., 2006). Individuals with anxiety may develop problems such as dependence because they may not feel alcohol's direct effects decreasing their symptoms (Quitkin, Rifkin, Kaplan, & Klein, 1972).

Consequently, they may increase the amount of alcohol or drugs to the point of unconsciousness to stop the feelings of panic or anxiety (Quitkin et al., 1972).

Research examining anxiety and risk-taking behaviors as a result of the consumption of alcohol is limited. With regard to risky driving behaviors, Shahar (2009) found that higher trait anxiety was positively associated with risky driving behavior. Other research (e.g., Ulleberg & Rundmo, 2003; Vassallo, Smart, Sanson, Cockfield, Harris, McIntyre, & Harrison, 2008) found that anxiety is unrelated to risky driving theoretically because of their increased level of worry. With regard to sexual risk-taking, Kalichman & Weinhardt (2001) found that anxiety was unrelated to sexual risk-taking. Research investigating negative affect and problem behaviors, however, has suggested that individuals with internalized distress (e.g., anxiety) may engage in more risky behaviors as a means of avoiding dealing with emotional distress. In a study examining social anxiety specifically, Kashdan, Collins, and Elhai (2006) found that individuals higher in social anxiety were more likely to engage in risky behaviors (i.e., illicit drug use, sexual risk-taking, and aggression). With regard to drug use, some studies (e.g., de Moja, 1990; Taylor & del Pilar, 1992) found that higher trait anxiety is predictive of more drug use overall, whereas others found the opposite (e.g., Hobfoll & Segal, 1983). These studies are older, however, and some have a small sample size that is restricted to men.

Anxiety and caffeine use. Caffeine has been found to produce feelings of anxiety and panic, especially among those who are already prone to experiencing these symptoms. Older research studies have generally found that those who are anxious tend to have an increased sensitivity to caffeine (Boulenger, Uhde, Wolff, & Post, 1984; Lee,

Cameron, & Greden, 1984). Specifically, one study of 43 outpatients diagnosed with anxiety disorders and 124 non-anxiety disorder medical inpatients investigated the relationship between caffeine consumption, sensitivity and anxiety (Lee et al., 1984). Individuals with an anxiety disorder were found to be three times more likely to report having symptoms of anxiety after consuming the same amount of coffee as a non-anxiety disorder patient. Symptoms of anxiety included palpitations, tachycardia, and tremulousness (Lee et al., 1984). Having an increased sensitivity to caffeine may lead to adverse behavioral effects, such as fine motor performance and caffeine withdrawal (Lieberman, 1992).

In regards to typical caffeine consumption among those who are anxious, however, research findings have been mixed. Overall, older studies have found that those who are more trait anxious either consume less caffeine than those who are not anxious (Hire, 1978; Lee et al., 1984) or do not differ in typical amount of caffeine consumed (Boulenger et al., 1984; Holle, Heimberg, Sweet, & Holt, 1995). An older study of 68 female and 23 male college students reported a negative relationship ($r = -.37$) between anxiety and caffeine, such that the higher anxiety one typically experiences, the less coffee one consumes (Hire, 1978). Another study found that anxiety patients have a decreased consumption of caffeine, presumably to avoid its anxiety-provoking effects (Lee et al., 1984). They found that 84% of anxious patients were low caffeine consumers whereas 41% of non-anxious medical inpatients were low consumers. Sixty-five percent of patients with anxiety disorders consumed less than 100 mg of caffeine per day (Lee et al., 1984). Another study found that those with panic disorder (a specific type of anxiety disorder; APA, 2000) had no difference in daily consumption of caffeine compared to the

control group (Boulenger et al., 1984).

More recently, however, research has shown that people will frequently use caffeine under stress. Ratliff-Crain and Kane (1995) studied 182 female and 106 male participants who completed survey questions pertaining to their daily amount of consumption, the type of circumstances in which they consumed caffeine (i.e., "When you are experiencing stress at home, school, or on the job, how does the stress affect your use of coffee?"; Ratliff-Crain & Kane, 1995). Researchers found that 55% of their sample reported an increased use of caffeine when they felt stressed specifically for relief reasons (e.g., when feeling pressure, tense, or upset) and coping reasons. Only 3% reported decreasing consumption when under stress.

Anxiety and stress. If an individual experiences persistent stress, similar to an individual with trait anxiety, it is possible that he or she may use more caffeine to manage their anxiety. Though stress is defined as a reaction to physical, emotional, or mental strain and anxiety is a feeling of an impending doom and apprehension, there is a definite link between the two constructs (Becker, 1976). A holistic view of stress and anxiety suggests a vicious cycle between anxiety and stress, such that anxiety is accompanied by stress, and stress will lead to anxiety, which will become stressful (Becker, 1976). Research has documented a positive correlation between anxiety and stress (Saks, 1994; Scholotz, Schulz, Hellhammer, Stone & Hellhammer, 2006). One experimental study of 71 participants examining the relationship between stress, trait anxiety, and cortisol (a stress hormone), found that trait anxiety mediated the relationship between performance pressure (a type of stressor) and salivary cortisol (Scholotz et al., 2006). This was such that those higher in trait anxiety produced a stronger association in this relationship as a

moderator variable (Scholotz et al., 2006). This suggested that individuals higher in trait anxiety interpreted stressors differently than individuals lower in trait anxiety, such that they interpreted these stress-relevant events as more threatening.

Anxiety and coping. Individuals with greater levels of anxiety may learn that alcohol will reduce stress and will develop a habit of using alcohol as a means of coping (Cooper, Russell, Skinner, & Windle, 1992). Those with high trait anxiety are more likely to endorse coping motives in regards to alcohol and other drug use (Stewart & Zeitlin, 1995; Tate, Pomerleau, & Pomerleau, 1994). In a study examining anxiety and coping motives, researchers found that college students high in trait anxiety are likely to use coping motives (Stewart & Zeitlin, 1995). Coping motives were also a strong predictor in determining rate of cigarette use among trait anxious individuals (Tate et al., 1994). Endorsement of coping motives has been shown to predict drinking alone habits, heavy alcohol consumption, and severe alcohol-related problems in the general population (Cooper et al., 1992).

Research has examined specific types of coping that may be utilized by individuals with GAD (e.g., Borkovec & Roemer, 1995; Fledderus, Bohlmeijer, & Pieterse, 2010). Individuals with anxiety tend to endorse avoidance coping strategies to manage their stress, worry, and emotions (Borkovec & Roemer, 1995). Those who utilize avoidance coping as a cognitive and behavioral reaction to stress have been found to be easily overwhelmed, excessively worry, and attempt to escape reality (Fledderus et al., 2010). Individuals with GAD were more likely to report distracting themselves from emotional topics significantly more than individuals who did not have anxiety (Borkovec & Roemer, 1995). One study of college students found that the use of avoidance coping

among individuals with GAD may be due to a lack of emotional regulation (McLaughlin, Mennin, & Farach, 2007). Researchers showed a distressing film to individuals with and without GAD. Those with GAD were less able to control their emotions and displayed poor understanding and acceptance. The use of avoidance coping has been found to be related to drug use (Belding, Iguchi, Lam, Lakin, & Terry, 1996) and alcohol-related problems (Moos, Brennan, Fondacaro, & Moos, 1990).

Theoretical Foundation

Several theories have been offered to explain the association between anxiety and substance use. The self-medication hypothesis (Quitkin et al., 1972) states that individuals with anxiety disorders consume more alcohol to self-medicate their symptoms. Alcohol expectancy theory (Goldman, Del Boca, & Darkes, 1999) states that individuals with anxiety may hold certain expectations about the effects of alcohol, such that consuming alcohol may reduce tension. However, the theory that has received the most empirical support is social learning theory (Bandura, 1977).

Social learning theory. Social learning theory (SLT; Bandura, 1969, 1977; Maisto, Carey & Bradizza, 1999) contends that the relationship between anxiety and alcohol use is due to cognitions, such as the learned use of negative reinforcement (i.e., stress reduction) and a lack of more beneficial coping strategies. In particular, differential reinforcement and cognitive processes can have an impact on one's alcohol consumption. Differential reinforcement focuses on positive or negative reinforcements as a result of one's behavior. For instance, if one drinks at a party, they will more likely be reinforced by feelings of relaxation and social approval than when drinking at the workplace (Maisto et al., 1999). Cognitive processes consist of encoding, organizing,

and retrieving information from the social environment (Bandura, 1969). For example, one will attempt to use certain cognitive processes as a way to cope with the environment when stressed (Bandura, 1969). The mechanism of stress reduction, a negative reinforcer, could be an important factor relating to increased alcohol and other drug use. For example, if an individual is stressed and successfully uses alcohol as a reduction mechanism, one may be more likely to use alcohol in the future when stressed. If one is stressed often enough, this may develop into a habit, potentially resulting in alcohol-related problems.

According to SLT, drinking alcohol is a cognitive process – alcohol converts negative, stressful feelings into positive feelings (Bandura, 1969; Maisto et al., 1999). Positive feelings, as a result of consuming alcohol, are learned and retrieved later on when the drinker is in a drinking situation again. An individual will repeat this behavior, (i.e., drinking alcohol and taking drugs) which leads to a positive reward, such as positive physiological feelings. Overall, if one uses alcohol as a means to cope, they may have an inclination to consume alcohol in the future to cope, potentially leading to alcohol-related problems. As individuals with GAD have been shown to utilize avoidance coping mechanisms (Borkovec & Roemer, 1995) in response to stress to escape feelings of worry (i.e., using alcohol and other drugs; Stewart & Zeitlin, 1995; Tate et al., 1994), perhaps these individuals may similarly use caffeinated alcohol to cope if they experience the reinforcement of reduced stress when consuming this substance. Perhaps consuming caffeinated alcohol as an avoidance coping mechanism will lead to alcohol-related problems.

Study Purpose

The overall purpose of the present study was to explore the relationship between anxiety and caffeinated alcohol use. The present study represents the first to examine this association, particularly among a college student sample. Results will help provide additional insight into reasons for consuming caffeinated alcohol by students and its relationship with risk behaviors, and additional substance use. Further, this study will demonstrate the potential consequences of consuming caffeinated alcohol. Findings could contribute to the development of more specific alcohol intervention strategies for college students, and especially those higher in anxiety.

Aim 1: To examine the association between anxiety symptomology and caffeinated alcohol consumption.

Aim 1a: To examine the dichotomous association between anxiety symptomology and likelihood of caffeinated alcohol consumption.

Hypothesis 1a. Research is mixed regarding the consumption of caffeine. While earlier research suggests that those higher in anxiety tend to consume less caffeine (Hire, 1978; Lee et al., 1984), others do not support such differences (Boulenger et al., 1984; Holle et al., 1995). Some (Ratliff-Craine & Kane, 1995) report that individuals consume more caffeine when stressed (relative to anxiety; Saks, 1994; Scholotz et al., 2006). More consistently, though, individuals higher in anxiety symptomology are shown to be more likely to consume more alcohol (Bolton et al., 2006; Robinson et al., 2009). Thus, it was hypothesized that anxiety symptomology would predict likelihood of consuming caffeinated alcohol during a typical week in the past three months.

Aim 1b: To determine the continuous relationship between anxiety

symptomology and caffeinated alcohol use.

Hypothesis 1b. As previous research has demonstrated that individuals higher in anxiety tend to consume more alcohol than those lower in anxiety, it was hypothesized that there would be a positive relationship between anxiety symptomology and caffeinated alcohol use.

Aim 2 - 4: To examine the influence of anxiety symptomology on the relationship between caffeinated alcohol use and negative consequences (i.e., alcohol-related problems, risk behaviors, drug use).

Aim 2. To examine the link between caffeinated alcohol use and alcohol-related problems as moderated by level of anxiety symptomology.

Hypothesis 2. Research has shown that individuals higher in anxiety consume more alcohol and experience more alcohol-related problems than individuals lower in anxiety (Bolton et al., 2006; Robinson et al., 2009). Caffeinated alcohol use has been shown to relate to alcohol problems (O'Brien et al., 2008; Thombs et al., 2010, 2011; Woolsey et al., 2010). Given these findings, it was hypothesized that anxiety symptomology would moderate the relationship between caffeinated alcohol use and alcohol-related problems. Specifically, I expected that the relationship between consumption of caffeinated alcohol and alcohol-related problems would be stronger for those with greater levels of anxiety symptomology.

Aim 3. To examine the link between caffeinated alcohol use and risk behaviors (i.e., dangerous driving, risky sexual behaviors) as moderated by level of anxiety symptomology.

Hypothesis 3. Previous research on the associations between anxiety with

caffeinated alcohol use and risk behaviors has been limited or mixed. Problem Behavior Theory (Jessor & Jessor, 1977) suggests that engaging in the use of one substance (i.e., alcohol) makes one more likely to engage in other risk or problem behaviors. Thus, it was hypothesized that the positive relationship between caffeinated alcohol use and engaging in risk behaviors would be moderated by anxiety. Specifically, greater anxiety symptomologywould predict a stronger relationship between caffeinated alcohol use and risk behaviors.

Aim 4: To examine the relationship between caffeinated alcohol use and other substance use as moderated by levels of anxiety symptomology.

Hypothesis 4. Research has demonstrated that caffeinated alcohol users are more likely to engage in stimulant drug use (i.e., cocaine, amphetamines; Brache & Stockwell, 2011). Further, as individuals higher in anxiety have been shown to engage in substance use (e.g., de Moja, 1990; Tate et al., 1994, Taylor & del Pilar, 1992), it was hypothesized that the relationship between caffeinated alcohol use and other substance use (e.g., marijuana, opiates, stimulants, depressants, cigarettes) would be moderated by anxiety. Specifically, I expected that greater levels of anxiety symptomology would predict a stronger relationship between caffeinated alcohol consumption and other substance use.

Aim 5: To assess avoidance coping as an explanatory variable in the relationship between anxiety symptomology and caffeinated alcohol use, as well as alcohol-related problems.

Hypothesis 5. SLT suggests that if one has learned expectations of using alcohol as a coping mechanism, they may have a propensity to consume alcohol in the future to cope (Bandura, 1969, 1977; Maisto et al., 1999). Individuals with GAD have been found

to specifically endorse avoidance coping motives to escape reality, emotional experiences, and feelings of worry (Borkovec & Roemer, 1995; Fledderus et al., 2010; McLaughlin et al., 2007). Therefore, it was hypothesized that using substances to cope would explain the relationship between anxiety symptomology and caffeinated alcohol use and problems (if the relationship between anxiety symptomology and caffeinated alcohol use and problems exists, as detailed in hypothesis 1b). In particular, one's endorsement of avoidance coping would be a mediator in the relationship between anxiety symptomology and caffeinated alcohol use, as well as between anxiety and alcohol-related problems.

Aim 6: To examine the relationship between anxiety symptomology and reasons for consuming caffeinated alcohol.

Hypothesis 6. While several studies have examined reasons for caffeinated alcohol use (e.g., to reduce the sedative effects of alcohol; Ferreira et al., 2004; Marczinski, 2011; O'Brien et al., 2008), they did not examine using caffeinated alcohol to reduce fear, anxiety, or stress. Consequently, this study assessed anxiety symptomology and reasons for using caffeinated alcohol. It was hypothesized that greater anxiety symptomology would predict likelihood of endorsing the use of caffeinated alcohol to reduce stress, fear, or anxiety, as well as to avoid.

CHAPTER II

METHOD

Participants

To be eligible, participants must have (1) been at least 18 years or older, (2)

consumed alcohol in the past 30 days, and (3) been enrolled in college courses. Five

hundred and fifty six college students participated in the present study. Three students

experienced technical difficulties (i.e., their computer shut down during the survey) and

lost a large amount of data. Remaining data from these participants were deleted. From

here, 30 participants were not eligible for the present study (i.e., they did not report

consuming alcohol in the past 30 days), and were removed as well. Consistent with prior

research (e.g., O'Brien et al., 2008), for the majority of the analyses, only data from

participants who reported typical caffeinated alcohol consumption ($N = 231$; 44.2%) were

used. Of those who reported consuming caffeinated alcohol, the majority of participants

were female ($N = 150$; 64.9%). The average age was 20.1 ($SD = 3.82$) years. The

sample was comprised of 40.7% freshmen (40.7%), 31.6% sophomores, 15.2% juniors,

and 11.3% seniors. Most lived on-campus (55.4%). Sample ethnicity was 56.3%

Caucasian, 29.9% African American, 4.8% Hispanic, 3.9% Asian, and 1.7% Native

Hawaiian or Other Pacific Islander. Participants reported consuming an average of 13.3

($SD = 9.87$) alcohol-only drinks per week, and 6.63 ($SD = 6.19$) caffeinated alcohol

drinks per week.

Materials and Procedure

Data collection was administered via in-person groups, with participants recruited

through the psychology department. Participants provided informed consent at the start

of the study. They were provided with a computerized survey that took approximately 1

to 1.5 hours to complete. Students received course credit for their participation through

the psychology subject pool (i.e., SONA). This study was approved by the university's

college committee on human subjects research and followed APA guidelines (APA,

2002).

Measures

Demographics. Participants were asked several self-report items on their general

background. These questions included age, class standing, gender, living situation, race,

and ethnicity (see Appendix A).

Alcohol, caffeine, and caffeinated alcohol use. Participants' typical alcohol,

caffeine, and caffeinated alcohol consumption was measured using the Daily Drinking

Questionnaire (DDQ; Collins, Parks, & Marlatt, 1985; see Appendices B - D).

Alcohol. Participants reported the number of alcoholic (excluding caffeinated

alcohol) drinks they typically consume for each day of a typical week over the past three

months. A number of studies have used the DDQ (e.g., Geisner, Larimer, & Neighbors,

2004; Mallett, Bachrach, & Turrisi, 2008; Marlatt, Baer, Kivlahan, Dimeff, Larimer,

Quigley, & Williams, 1998; Morean & Corbin, 2008). The DDQ has found adequate

convergent validity as well with self-report measures of alcohol-related problems

(Collins, Bradizza, & Vincent, 2007; Collins, Koutsky, & Izzo, 2000; Collins & Lapp,

1992). In particular, one study examining malt liquor, marijuana use, and alcohol-related

problems used the DDQ to measure typical drinking (Collins et al., 2007). In this study,

the DDQ predicted heavy alcohol use and was used to correlate with marijuana use and

alcohol-related problems (Collins et al., 2007). Overall, the DDQ is reported to be an

adequate measure of alcohol consumption, as it significantly predicted alcohol use and drinking consequences in several studies (Mallett et al., 2008; Marlatt et al., 1998). To measure alcohol use, I used several indicators from this information, including total number of drinks consumed in a typical week, number of drinks reported for each drinking day, drinking frequency, as well as frequency of binge drinking in a typical week respective to their gender (four or more drinks/occasion for women; five or more drinks/occasion for men).

Caffeine and caffeinated alcohol. To measure caffeinated alcohol consumption, participants reported the number of caffeinated alcoholic drinks they typically consume for each day of the week over the past three months in the format of the DDQ (Collins et al., 1985). To measure caffeine usage, participants reported the number of caffeinated (nonalcoholic) beverages they typically consume for each day of the week in the past three months also in the DDQ format (Collins et al., 1985). Previous research has used a similar format, but asked participants to reflect on various lengths of time (i.e., the past year, the past month). For example, this includes asking participants to report the typical number of caffeinated alcoholic drinks in a drinking episode, the number of days of binge drinking in the past month, number of drinking days in a typical week, and greatest number of drinking days in the past month (O'Brien et al., 2008). To measure caffeine use, a similar style to Miller (2008) and Arria and colleagues (2011) was used. Miller (2008) also asked participants, "In the past 30 days, on how many days did you drink a Red Bull (or similar energy drink)?" with response options such as, 0 (*0 days*) to 30 (*all 30 days*). Arria and colleagues (2011) measured caffeine use by asking participants what their typical consumption caffeine use on a typical day during the past year.

Caffeine use was derived by summing the total amount of drinks in a week, with higher scores indicating higher amounts of caffeine consumed in a week. Indicators of caffeinated alcohol use will include total number of drinks consumed in a week, number of drinks reported for each drinking day, drinking frequency, as well as frequency of binge drinking in a typical week respective to their gender (four or more drinks/occasion for women; five or more drinks/occasion for men). For the purposes of this project, consistent with previous literature (O'Brien et al., 2008), caffeinated alcohol was defined as specifically simultaneously consuming caffeine and alcohol, rather than consuming caffeine and alcohol on separate occasions.

Substance use.

Drug use. The Drug Use History (Collins, Lapp, Emmons, & Isaac, 1990; Appendix E) was administered to assess frequency of different substance use in the past year. Responses were rated on a 5-point Likert scale (1 = *never* through 5 = *everyday*). Participants were asked to indicate how often they used specific substances including marijuana, opiates, barbiturates, crack, cocaine, and amphetamines. Based on previous research (Avant, Davis, & Cranston, 2011), individual substances were combined into the following categories: (1) stimulants (cocaine, crack, amphetamines), (2) marijuana, (3) depressants (tranquilizers, sedatives), (4) opiates (heroin), (5) hallucinogens (psychedelics), (6) inhalants, and (7) steroids. The Drug Use History has been used in previous research to detect substance use among college students (Collins et al., 2007; Collins et al., 1990; Collins, Kashdan, & Golinisch, 2003).

Tobacco use. Select questions from the National Survey on Drug Use and Health, an annual survey conducted by the Substance Abuse and Mental Health Services

Administration (Substance Abuse and Mental Health Services Administration

[SAMHSA]; 2006; Appendix F) were used to assess tobacco use. Participants were

asked self-report questions assessing their frequency and quantity of cigarette use over

the past 30 days. Items include open response options to questions such as, "During the

past 30 days, on how many days did you smoke a cigarette?" Additional items include

frequency of response options to questions such as, "On the days you smoked cigarettes

during the past 30 days, how many cigarettes did you smoke per day, on average?"

Response options range from 0 (*I did not smoke cigarettes in the past 30 days*) to 7 (*More

than 35 cigarettes per day*). Higher responses for both types of questions indicated

higher frequency and quantity of use. Given that there are only two questions, a

Cronbach alpha cannot be computed.

Anxiety. The State-Trait Anxiety Inventory (STAI Form Y-2; Spielberger,

Gorsuch, Lushene, Vagg, & Jacobs, 1983; Spielberger, 1970; Appendix G) was used to

measure anxiety. The 40-item self-report inventory has two subscales – one that

measures "state" symptoms (measuring symptoms of anxiety at this very moment; e.g., "I

feel secure"; "I am worried"), and one that measures trait symptoms (measuring

symptoms of anxiety in general; "I have disturbing thoughts"; "I feel inadequate"). The

STAI is assessed on a 4-point scale ranging from 1 (*never*) to 4 (*almost always*). The

STAI can range from 20 to 80 with higher scores indicating higher levels of anxiety. For

the purpose of this project, only the trait subscale that assesses general symptoms of

anxiety will be used. Previous researchers have used the Trait subscale only of the STAI

(e.g., de Visser, van der Knaap, van de Loo, van der Weerd, Ohl, & van den Bos, 2010;

Davis, Kerr, & Robinson-Kurpius, 2003; Novak, Burgess, Clark, Zvolensky, & Brown,

2003). The STAI has demonstrated adequate internal validity for the trait version ranging from .76 to .96 (Duke, Keeley, Ricketts, Geffken, & Storch, 2010; Swendsen, Tennen, Carney, Affleck, Willard, & Hromi, 2000; Healy, 2010). The STAI has been used in predicting substance use outcomes (Donham, Ludenia, Sands, & Holzer, 1984; Swendsen et al., 2000; Novak et al., 2003) as well as in a college student population (e.g., Duke et al., 2010; Garvin & Damson, 2008; Healy, 2010; Novak et al., 2003). In the present study, Cronbach α = .91.

Alcohol-related problems: Alcohol-related problems was assessed using the Young Adults Alcohol Consequences Questionnaire (YAACQ; Read, Kahler, Strong, & Colder, 2006; Appendix H). The YAACQ consists of 48 items measuring alcohol-related problems experienced in the past year. Response options consist of "*yes*" or "*no*", indicating if they have or have not experienced overall alcohol-related problems in the past year. The total score of the scale was calculated by summing the number of positive endorsements, with higher scores indicating a higher likelihood of experienced alcohol-related problems. This scale consists of eight subscales of different problems subsequently experienced with consuming alcohol: (1) social-interpersonal consequences ("I have said things while drinking that I later regretted"); (2) impaired control ("I have spent too much time drinking"); (3) self- perception ("I have felt badly about myself because of drinking"); (4) self-care ("I have been less physically active because of my drinking"); (5) risk behaviors ("I have injured someone else while drinking or intoxicated"); (6) academic/occupational consequences ("The quality of my work or schoolwork has suffered because of drinking"); (7) physical dependence ("I have felt like I needed a drink after I'd gotten up"); and (8) blackout drinking ("I have passed out from

drinking"). The subscales are calculated in the same fashion as calculating the total score

of problems by summing the "yes" responses corresponding to each subscale. Higher

scores indicate a higher likelihood of problems in that particular subscale. The YAACQ

has demonstrated an internal consistency with a Cronbach's alpha range of .63 to .79

(Barthelmes, Borsari, Hustad, & Barnett, 2010) to .89 (Read, Lau-Barraco, Dunn, &

Borsari, 2009). The YAACQ has also demonstrated concurrent validity with another

measure of alcohol-related problems, the Rutgers Alcohol Problem Index (RAPI; Read et

al., 2006; White & Labouvie, 1989). In the present study, Cronbach α = .93.

Coping. The COPE Inventory (Carver, Scheier, & Wientraub, 1989; Appendix I)

was used as a measure of avoidance coping in response to a stressful situation. The

COPE is a widely used 60-item self-report inventory consisting of 15 subscales (i.e.,

positive reinterpretation and growth, mental disengagement, focus on and venting of

emotions, use of instrumental social support, active coping, religious coping, behavioral

disengagement, restraint, use of emotional social support, substance use, acceptance,

suppression of competing activities, denial, humor, acceptance, and planning) with four

items for each subscale. Response options range from 1 (*I usually don't do this at all*) to

4 (*I usually do this a lot*). Previous literature (Litman, 2006) has demonstrated through

factor loading that the subscales (1) behavioral disengagement ("I reduce the amount of

effort I'm putting into solving the problem"), (2) mental disengagement ("I go to movies

or watch TV, to think about it less"), (3) substance use ("I use alcohol or drugs to help

me get through it"), and (4) denial ("I act as though it hasn't even happened") can be

used to create a composite avoidance coping subscale. Research has demonstrated that

using this subscale has demonstrated adequate internal consistency, ranging from alphas

of .80 to .88 (Litman & Lunsford, 2009; Wolf & Mori, 2009). Importantly, research has

demonstrated that within the avoidance coping subscale of the COPE, trait anxiety was

positively related to all avoidance coping items (Litman, 2006). In the present study, the

Cronbach α for the avoidance coping subscale = .87.

Risk behaviors.

Sexual risk behaviors. The Sexual Risk Survey (SRS; Turchik & Garske, 2009;

Appendix J) was used as a measure of sexual risk behaviors. The SRS is a 23-item self-

report measure consisting of frequency questions of engaging in various non-intercourse

behaviors in the past six months. These items include "How many times have you

'hooked up' but not had sex with someone you didn't know or didn't know well?" and

intercourse behaviors such as, "How many times have you had vaginal intercourse

without protection against pregnancy". The survey defines "sex" to include oral, anal,

and vaginal intercourse, and "sexual behavior" to include making out, passionately

making out, fondling, petting, oral-to-anal stimulation, and hand-to-genital stimulation.

The scale is scored in terms of frequencies in which 1 = 40% of responses; 2 = 30% of

responses, 3 = 20% of responses, and 4 = 10% of responses (Turchik & Garske, 2009). If

the participant did not engage in the behavior, 0 = 0. Higher reported frequencies

indicate a greater likelihood of experienced sexual risk behaviors. The SRS has been

used in studies significantly correlating substance use and risky sexual behaviors among

college students (Turchik & Garske, 2009; Turchik, Garske, Probst, & Irvin, 2010). The

SRS has demonstrated excellent internal consistency with Cronbach alphas ranging from

.82 to .88 (Marcus, Fulton, & Turchik, 2011; Turchik & Garske, 2009). In the present

study, Cronbach α = .90.

Driving risk behaviors. The Dula Dangerous Driving Index (DDDI; Dula &

Ballard, 2003; Appendix K) was used to measure various risky driving behaviors. The

DDDI consists of 31 self-report items indicating the likelihood of engaging dangerous

driving. The DDDI consists of three subscales: (1) aggressive driving ("I make rude

gestures (e.g., giving "the finger," yelling curse words) toward drivers who annoy me"),

(2) negative emotional driving ("I lose my temper when driving"), (3) risky driving ("I

will drive when I am drunk"). Items are rated on a 5-point scale (1 = *never*, 5 = *always*).

The overall scale score measuring dangerous driving behavior is calculated by summing

the items with higher scores indicating greater frequency of dangerous driving behavior.

Subscales are calculated in the same fashion, summing the scores for the items

corresponding to the respective scale, with higher scores indicating greater frequency of

dangerous driving in that particular domain. The DDDI has been found to demonstrate

excellent internal reliability ranging from .83 to .92 (Dula & Ballard, 2003; Willemsen,

Dula, Declercq, & Verhaeghe, 2008) and has demonstrated concurrent, divergent, and

predictive validity (Dula & Ballard, 2003). Its subscales have also demonstrated

adequate internal reliability (risky driving, α = .83; negative emotional driving, α = .85;

aggressive driving, α = .84). In addition, the DDDI has been used to predict dangerous

driving due to substance abuse (Richer & Bergeron, 2009). In the present study,

Cronbach α = .94.

Reasons for caffeinated alcohol use. Findings from previous studies (O'Brien et

al., 2008; Ferreira et al., 2004; Appendix L) served as the foundation of a multiple

response item measure to assess reasons for using caffeinated alcohol. These responses

included more common reasons for using such as, "To hide the flavor of alcohol", "To

feel less drunk", "Increase happiness", "Feel euphoric", "Feel less inhibited", and "Feel

more physical vigor". Also, less frequent response options were provided such as, "To

drink more without appearing drunk" and "So I wouldn't get a hangover". Two response

options hypothesized to pertain to individuals higher in anxiety directly were included:

(1) "To reduce stress" and (2) "To reduce fear, anxiety, or avoidance". Additionally, a

free-response option was included to allow participants to report any other reasons not

offered on the survey for consuming caffeinated alcohol.[1]

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[1] Due to an error, only 32% of participants who used caffeinated alcohol were provided
with the response option of using caffeinated alcohol to "reduce stress" and "reduce fear,
anxiety, or avoidance".

CHAPTER III

RESULTS

Before any analyses were conducted, data were cleaned and missing data were addressed. Extreme outliers outside the 3 interquartile ranges were Winsorized (Barnet & Lewis, 1994) to match the next highest data point. Linear regression assumptions were also addressed. Histograms and Q-Q plots were used to assess normality and skewness and kurtosis. Assumptions of residuals were also checked (i.e., homoscedasticity, independence, normality, multivariate outliers, multicollinearity). There were no violations of multicollinearity, independence, or homoscedasticity assumptions. To correct for several issues in the data (i.e., leverage, normality, skewness), I transformed several predictor variables (i.e., caffeinated alcohol quantity and binge frequency) by taking their square roots. Although the transformed data made these variables more normalized, the outcomes of the transformed data were the same as the outcomes of untransformed data. For ease in interpretability, data from untransformed variables will be used in subsequent analyses. Predictor variables (i.e., caffeinated alcohol quantity, frequency, binge frequency; anxiety symptoms; interactions) were centered for all moderation analyses. The results of correlations between caffeinated alcohol use variables and outcomes (e.g., alcohol-related problems, risky behaviors) can be seen in Table 1.

Table 1

Correlations of Caffeinated Alcohol and Risky Outcomes

	CA Quantity	CA Frequency	CA Binge Frequency
Alcohol-related Problems	.08	-.02	.18*
Sexual Risk Behavior	.06	.07	-.06
Risky Driving	.05	.11	-.01
Stimulant Use	.04	-.09	.04
Depressant Use	-.08	-.06	.00
Marijuana Use	-.03	-.04	-.03
Opiate Use	.00	-.09	.04
Steroid Use	-.00	-.02	-.01
Inhalant Use	-.01*	-.11	-.11
Psychedelic Use	-.00	-.13	-.09
Cigarette Use Frequency	.12	-.02	.23**
Cigarette Use Quantity	.12	.00	.17*

$*p < .05. **p < .001.$

Note. CA = Caffeinated Alcohol.

Aim 1: To examine the association between caffeinated alcohol use and anxiety symptomology.

Aim 1a. To examine the dichotomous association between anxiety symptomology and likelihood of caffeinated alcohol consumption.

Hypothesis 1a. It was hypothesized that anxiety symptomology would predict the likelihood of consuming caffeinated alcohol. To test this hypothesis, a logistic regression was conducted whereby caffeinated alcohol use was dichotomized as an outcome (i.e., 0 = *no reported caffeinated alcohol use*, 1 = *at least one caffeinated alcohol drink reported during a typical week in the past three months)* with anxiety as a continuous predictor. Controlling for typical alcohol use, results indicated that anxiety was unrelated to caffeinated alcohol use status, odds ratio = 1.00, 95% CI: [0.98, 1.02], p = .690.

Aim 1b. To determine the degree of a continuous relationship between caffeinated alcohol use and anxiety symptomology.

Hypothesis 1b. It was hypothesized that higher anxiety symptomology would predict greater consumption of caffeinated alcohol when measured continuously. For the remaining analyses, only caffeinated alcohol consumers were examined. After controlling for typical alcohol use, simple correlations revealed that caffeinated alcohol use was not related to symptoms of anxiety. That is, anxiety was unrelated to caffeinated alcohol use quantity (r = .04, p = .556), frequency (r = .10, p = .138), and binge frequency (r = -.01, p = .942).

Aim 2 - 4: To examine the influence of anxiety symptomology on the relationship between caffeinated alcohol use and negative consequences (i.e., alcohol-related problems, risk behaviors, drug use).

Hypothesis 2: It was hypothesized that the relationship between caffeinated alcohol use (i.e., quantity, frequency, and binge frequency) and alcohol-related problems would be moderated by anxiety symptomology. Typical alcohol use was controlled in each analysis. As can be seen in Table 2, anxiety symptoms did not moderate the relationship between any caffeinated alcohol use variables and alcohol-related problems.

Hypothesis 3: It was hypothesized that the relationship between caffeinated alcohol use and risky behaviors (i.e., risky driving, risky sexual behavior) would be moderated by anxiety symptomology. Results indicated that anxiety symptoms did not moderate the relationship between any caffeinated alcohol use indices and risky driving (see Table 3). Anxiety symptoms also did not moderate the relationship between any caffeinated alcohol use variables and risky sexual behavior (see Table 4).

Hypothesis 4: Participants reported using stimulants (5%), depressants (19.5%), marijuana (47.3%), opiates (4%), steroids (1.7%), inhalants (2.2%), or psychedelics (4.3%) at least once in the past 12 months. Anxiety was significantly, positively correlated with use of depressants, marijuana, opiates, and steroids, but unrelated to use of stimulants, inhalants, psychedelics, and cigarettes (see Table 5).

Table 2

Standardized Regression Coefficients for Anxiety, Caffeinated Alcohol Use, and their Interaction on Alcohol-related Problems

Regression and Predictors	B	SE	p	partial r^2
CA Quantity				
Anxiety	0.35	0.06	.000	
Alcohol quantity	0.31	0.06	.000	
CA quantity	0.14	0.10	.043	
CA quantity x Anxiety	-0.02	0.01	.733	*ns*
CA Frequency				
Anxiety	0.38	0.06	.000	
Alcohol quantity	0.35	0.06	.000	
CA frequency	0.03	0.46	.656	
CA frequency x Anxiety	-0.10	0.04	.131	*ns*
CA Binge Frequency				
Anxiety	0.35	0.06	.000	
Alcohol quantity	0.32	0.06	.000	
CA binge	0.19	1.71	.005	
CA binge x Anxiety	0.06	0.17	.327	*ns*

Note. CA = Caffeinated Alcohol.

Table 3

Standardized Regression Coefficients for Anxiety, Caffeinated Alcohol Use, and their Interaction on Risky Driving Behavior

Regression and Predictors	B	SE	p	partial r^2
CA Quantity				
Anxiety	0.19	0.06	.008	
Alcohol quantity	0.26	0.06	.000	
CA quantity	0.05	0.09	.531	
CA quantity x Anxiety	0.04	0.01	.553	ns
CA Frequency				
Anxiety	0.19	0.06	.008	
Alcohol quantity	0.24	0.05	.001	
CA frequency	0.13	0.40	.070	
CA frequency x Anxiety	-0.03	0.04	.707	ns
CA Binge Frequency				
Anxiety	0.19	0.06	.006	
Alcohol quantity	0.28	0.06	.000	
CA binge	-0.01	1.53	.930	
CA binge x Anxiety	0.05	0.15	.513	ns

Note. CA = Caffeinated Alcohol.

Table 4

Standardized Regression Coefficients for Anxiety, Caffeinated Alcohol Use, and their

Interaction on Sexual Risk Behaviors

Regression and Predictors	*B*	*SE*	*p*	partial r^2
CA Quantity				
Anxiety	0.18	0.10	.008	
Alcohol quantity	0.30	0.10	.000	
CA quantity	0.04	0.17	.537	
CA quantity x Anxiety	0.05	0.02	.477	*ns*
CA Frequency				
Anxiety	0.18	0.10	.009	
Alcohol quantity	0.31	0.10	.000	
CA frequency	0.04	0.74	.591	
CA frequency x Anxiety	0.04	0.07	.543	*ns*
CA Binge Frequency				
Anxiety	0.19	0.10	.006	
Alcohol quantity	0.38	0.10	.000	
CA binge	-0.06	2.82	.362	
CA binge x Anxiety	0.03	0.29	.672	*ns*

Note. CA = Caffeinated Alcohol.

Table 5

Correlations of Anxiety and Risky Outcomes

	Anxiety level
Alcohol use	-.01
Alcohol-related problems	.38***
Sexual risk behavior	.21**
Risky driving	.21**
Stimulant use [a]	.03
Depressant use [b]	.17*
Marijuana use	.18*
Opiate use	.17*
Steroid use	.17*
Inhalant use	.09
Psychedelic use	-.02
Cigarette use frequency	.05
Cigarette use quantity	-.22

*$p < .05$. **$p < .01$. ***$p < .001$.

It was hypothesized that the relationship between caffeinated alcohol use and substance use would be moderated by anxiety symptomology. Anxiety symptoms moderated the relationship between caffeinated alcohol use quantity and stimulant drug use (see Table 6). Simple slope analyses revealed that for individuals higher in anxiety, caffeinated alcohol use quantity significantly predicted less stimulant use, $B = -0.03$, $SE = 0.01$, $p = .002$. For individuals lower in anxiety, caffeinated alcohol use quantity significantly predicted greater stimulant use, $B = 0.05$, $SE = 0.01$, $p < .001$ (see Figure 1). Anxiety also moderated the relationship between caffeinated alcohol use binge frequency and stimulant drug use. Simple slopes revealed that for those higher in anxiety, caffeinated alcohol use binge frequency did not significantly predict stimulant use, $B = -0.31$, $SE = 0.18$, $p = .080$. For those lower in anxiety, greater caffeinated alcohol use predicted greater stimulant use, $B = 0.42$, $SE = 0.17$, $p = .015$ (see Figure 2). Anxiety moderated the relationship between caffeinated alcohol use quantity and psychedelic drug use (see Table 12). Simple slope analyses revealed that for individuals higher in anxiety, caffeinated alcohol use quantity significantly predicted less psychedelic drug use, $B = -0.01$, $SE = 0.00$, $p = .001$. For those lower in anxiety, caffeinated alcohol use quantity was not associated with psychedelic drug use, $B = 0.00$, $SE = 0.00$, $p = 0.150$ (see Figure 3).

Table 6

Standardized Regression Coefficients for Anxiety, Caffeinated Alcohol Use, and their Interaction on Stimulant Drug Use

Regression and Predictors	B	SE	p	partial r^2
CA Quantity				
Anxiety	0.04	0.00	.533	
Alcohol quantity	0.27	0.00	.000	
CA quantity	0.07	0.00	.287	
CA quantity x Anxiety	-0.36	0.00	.000	.126
CA Frequency				
Anxiety	0.02	0.01	.750	
Alcohol quantity	0.32	0.00	.000	
CA frequency	-0.05	0.03	.459	
CA frequency x Anxiety	-0.11	0.00	.140	*ns*
CA Binge Frequency				
Anxiety	0.01	0.00	.863	
Alcohol quantity	0.29	0.00	.000	
CA binge	0.03	0.13	.661	
CA binge x anxiety	-0.21	0.01	.003	.042

Note. CA = Caffeinated Alcohol.
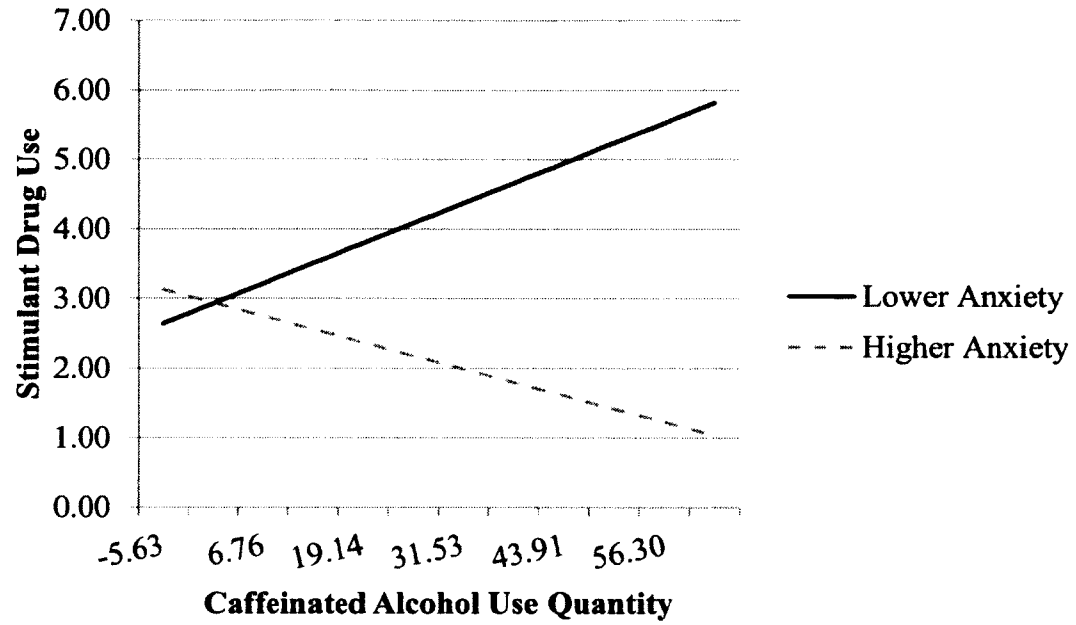
Figure 1. The impact of anxiety on the relationship between caffeinated alcohol use quantity and stimulant drug use.
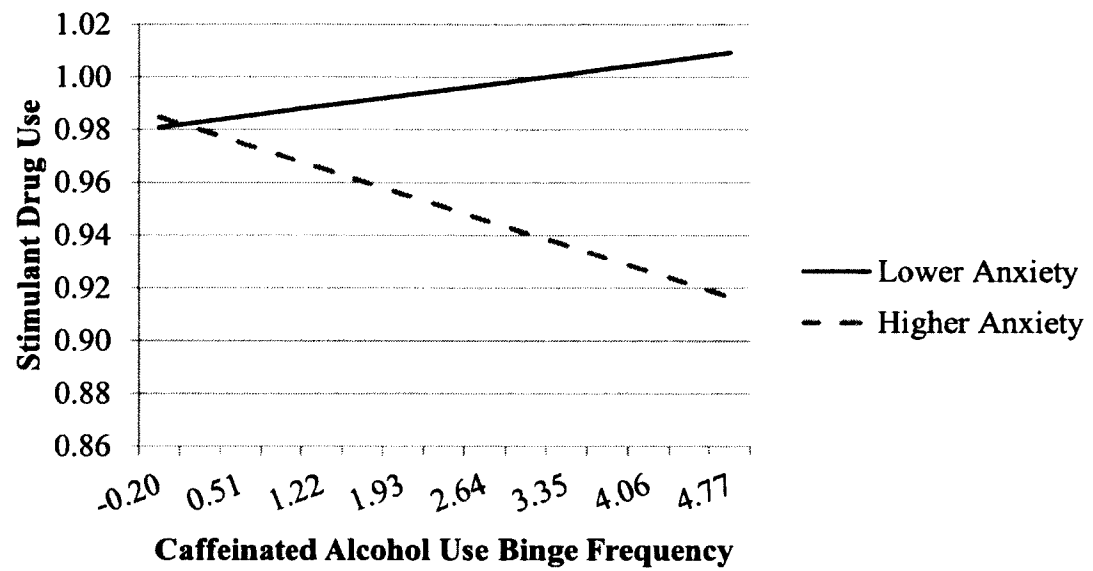
Figure 2. The impact of anxiety on the relationship between caffeinated alcohol use binge frequency and stimulant drug use.
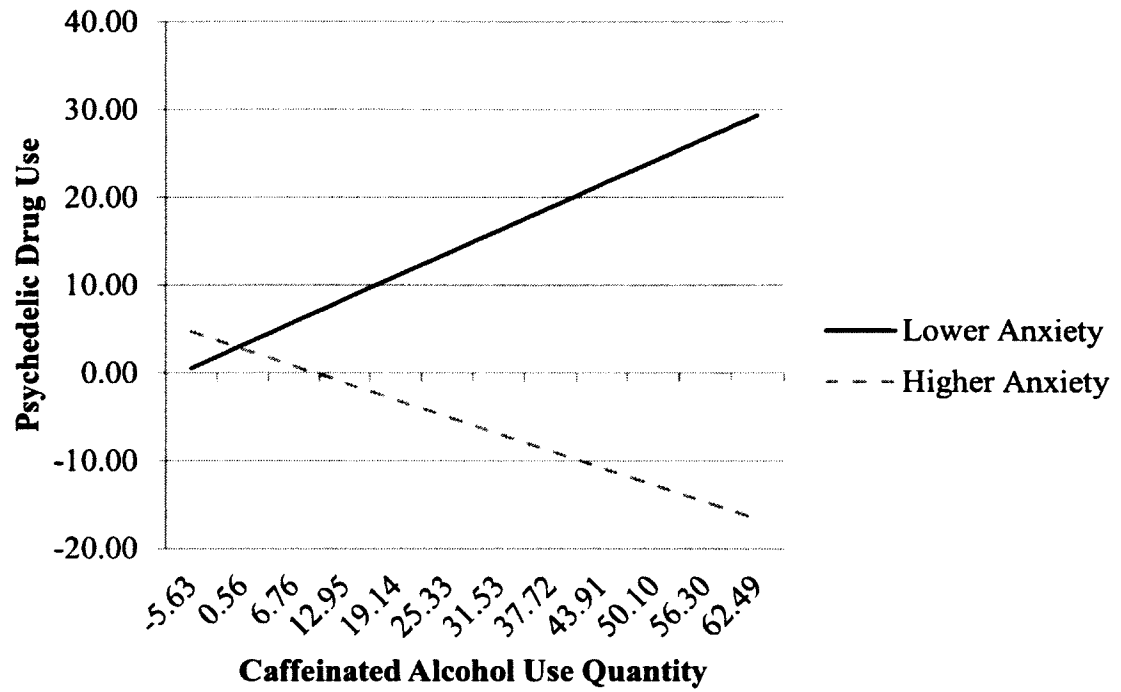
Figure 3. The impact of anxiety on the relationship between caffeinated alcohol use

quantity and psychedelic drug use.

Regarding cigarette use, to reduce inflated outcomes due to non-users, only participants ($n = 57$) who reported smoking at least one cigarette in the past month (i.e., the number of days participants used at least one cigarette in the past month) were included. Findings showed that anxiety symptoms did not moderate the relationship between any caffeinated alcohol use variable and cigarette use frequency or between caffeinated alcohol use and cigarette use quantity (see Tables 13 and 14). Anxiety symptoms did not moderate the relationship between caffeinated alcohol use frequency and any drug use (see Tables 6-12).

Table 7

Standardized Regression Coefficients for Anxiety, Caffeinated Alcohol Use, and their Interaction on Depressant Drug Use

Regression and Predictors	*B*	*SE*	*p*	partial r^2
CA Quantity				
Anxiety	0.12	0.01	.091	
Alcohol quantity	0.09	0.01	.224	
CA quantity	-0.06	0.01	.436	
CA quantity x anxiety	-0.09	0.00	.216	*ns*
CA Frequency				
Anxiety	0.12	0.01	.089	
Alcohol quantity	0.08	0.01	.279	
CA frequency	-0.03	0.04	.698	
CA frequency x Anxiety	-0.06	0.00	.414	*ns*
CA Binge Frequency				
Anxiety	0.11	0.01	.126	
Alcohol quantity	0.09	0.01	.247	
CA binge	-0.03	0.16	.727	
CA binge x Anxiety	-0.00	0.02	.977	*ns*

Note. CA = Caffeinated Alcohol.

Table 8

Standardized Regression Coefficients for Anxiety, Caffeinated Alcohol Use, and their Interaction on Cannabinoid Drug Use

| Regression and Predictors	B	SE	p	partial r^2
CA Quantity				
Anxiety	0.16	0.01	.024	
Alcohol quantity	0.29	0.01	.000	
CA quantity	-0.10	0.02	.156	
CA quantity x Anxiety	-0.07	0.00	.350	ns
CA Frequency				
Anxiety	0.17	0.01	.017	
Alcohol quantity	0.28	0.01	.000	
CA frequency	-0.14	0.07	.058	
CA frequency x Anxiety	-0.07	0.01	.321	ns
CA Binge Frequency				
Anxiety	0.14	0.01	.036	
Alcohol quantity	0.26	0.01	.000	
CA binge	-0.02	0.26	.737	
CA binge x Anxiety	-0.02	0.03	.748	ns

Note. CA = Caffeinated Alcohol.

Table 9

Standardized Regression Coefficients for Anxiety, Caffeinated Alcohol Use, and their Interaction on Opioid Drug Use

| Regression and Predictors	B	SE	p	partial r^2
CA Quantity				
Anxiety	0.12	0.00	.109	
Alcohol quantity	0.07	0.00	.374	
CA quantity	0.03	0.00	.649	
CA quantity x Anxiety	-0.09	0.00	.232	*ns*
CA Frequency				
Anxiety	0.12	0.00	.094	
Alcohol quantity	0.10	0.00	.174	
CA frequency	-0.09	0.01	.216	
CA frequency x Anxiety	-0.03	0.00	.733	*ns*
CA Binge Frequency				
Anxiety	0.11	0.00	.138	
Alcohol quantity	0.08	0.00	.297	
CA binge	0.04	0.05	.552	
CA binge x Anxiety	0.01	0.01	.858	*ns*

Note. CA = Caffeinated Alcohol.

Table 10

Standardized Regression Coefficients for Anxiety, Caffeinated Alcohol Use, and their
Interaction on Steroid Drug Use

Regression and Predictors	B	SE	p	partial r^2
CA Quantity				
Anxiety	0.18	0.00	.011	
Alcohol quantity	0.03	0.00	.730	
CA quantity	-0.03	0.00	.722	
CA quantity x Anxiety	-0.03	0.00	.714	*ns*
CA Frequency				
Anxiety	0.19	0.00	.010	
Alcohol quantity	0.02	0.00	.766	
CA frequency	-0.02	0.01	.772	
CA frequency x Anxiety	-0.02	0.00	.781	*ns*
CA Binge Frequency				
Anxiety	0.18	0.00	.013	
Alcohol quantity	0.02	0.00	.780	
CA binge	0.01	0.03	.885	
CA binge x Anxiety	0.03	0.00	.731	*ns*

Note. CA = Caffeinated Alcohol.

Table 11

Standardized Regression Coefficients for Anxiety, Caffeinated Alcohol Use, and their Interaction on Inhalant Drug Use

Regression and Predictors	B	SE	p	partial r^2
CA Quantity				
Anxiety	0.11	0.00	.130	
Alcohol quantity	0.28	0.00	.000	
CA quantity	-0.16	0.00	.231	
CA quantity x Anxiety	-0.14	0.00	.047	ns
CA Frequency				
Anxiety	0.11	0.00	.120	
Alcohol quantity	0.25	0.00	.001	
CA frequency	-0.11	0.01	.138	
CA frequency x Anxiety	-0.03	0.00	.699	ns
CA Binge Frequency				
Anxiety	0.10	0.00	.173	
Alcohol quantity	0.26	0.00	.000	
CA binge	-0.12	0.04	.089	
CA binge x Anxiety	-0.01	0.00	.901	ns

Note. CA = Caffeinated Alcohol.

Table 12

Standardized Regression Coefficients for Anxiety, Caffeinated Alcohol Use, and their Interaction on Psychedelic Drug Use

Regression and Predictors	B	SE	p	partial r^2
CA Quantity				
Anxiety	-0.01	0.00	.948	
Alcohol quantity	0.21	0.00	.005	
CA quantity	-0.09	0.00	.231	
CA quantity x Anxiety	-0.14	0.00	.047	.000
CA Frequency				
Anxiety	-0.01	0.00	.929	
Alcohol quantity	0.22	0.00	.003	
CA frequency	-0.12	0.01	.100	
CA frequency x Anxiety	-0.02	0.00	.837	*ns*
CA Binge Frequency				
Anxiety	-0.02	0.00	.748	
Alcohol quantity	0.21	0.00	.004	
CA binge	-0.11	0.05	.145	
CA binge x Anxiety	-0.06	0.01	.414	*ns*

Note. CA = Caffeinated Alcohol.

Table 13

Standardized Regression Coefficients for Anxiety, Caffeinated Alcohol Use, and their Interaction on Cigarette Use Frequency

Regression and Predictors	B	SE	p	partial r^2
CA Quantity				
Anxiety	-0.11	0.27	.468	
Alcohol quantity	0.27	0.21	.086	
CA quantity	-0.02	0.35	.889	
CA quantity x Anxiety	-0.10	0.03	.520	ns
CA Frequency				
Anxiety	-0.12	0.26	.413	
Alcohol quantity	0.35	0.21	.026	
CA frequency	-0.17	2.01	.250	
CA frequency x Anxiety	0.17	0.21	.256	ns
CA Binge Frequency				
Anxiety	-0.07	0.26	.654	
Alcohol quantity	0.23	0.20	.125	
CA binge	0.11	6.40	.470	
CA binge x Anxiety	-0.17	0.59	.263	ns

Note. CA = Caffeinated Alcohol.

Table 14

Standardized Regression Coefficients for Anxiety, Caffeinated Alcohol Use, and their Interaction on Cigarette Use Quantity

Regression and Predictors	B	SE	p	partial r^2
CA Quantity				
Anxiety	0.06	0.04	.072	
Alcohol quantity	0.28	0.03	.723	
CA quantity	0.02	0.06	.768	
CA quantity x Anxiety	-0.20	0.01	.174	ns
CA Frequency				
Anxiety	0.02	0.04	.893	
Alcohol quantity	0.36	0.03	.024	
CA frequency	-0.12	0.33	.407	
CA frequency x Anxiety	0.10	0.04	.511	ns
CA Binge Frequency				
Anxiety	0.10	0.04	.520	
Alcohol quantity	0.27	0.03	.074	
CA binge	0.09	1.01	.559	
CA binge x Anxiety	-0.27	0.09	.074	ns

Note. CA = Caffeinated Alcohol.

Aim 5: To examine avoidance coping as a mediator in the relationship between anxiety

symptomology and caffeinated alcohol use, as well as between anxiety and alcohol-

related problems.

Hypothesis 5: Path analyses were conducted to examine avoidance coping as a

mediator in these associations. Each individual model was tested using the statistical

software program, MPlus 5.2 (Muthen & Muthen, 2008). Each model was bootstrapped

at 1000 iterations in order to provide reliable standard errors and confidence intervals.

Analyses indicated that avoidance coping mediated the relationship between anxiety and

caffeinated alcohol use quantity, estimate = 0.09, 95% CI [0.02, 0.15], caffeinated

alcohol use frequency, estimate = 0.06, 95% CI [0.00, 0.12], caffeinated alcohol use

binge frequency, estimate = 0.09, 95% CI [0.01, 0.16], and alcohol-related problems,

estimate = 0.12, 95% CI [0.05, 0.18].

Aim 6: To explore the relationship between anxiety symptomology and reasons for

consuming caffeinated alcohol.

Hypothesis 6: It was hypothesized that higher self-reported anxiety

symptomology would predict the likelihood of using caffeinated alcohol for the purposes

of reducing stress and reduce fear, anxiety, or avoidance. A logistic regression was

conducted to examine anxiety symptoms as a continuous predictor with reasons for using

as a dichotomous outcome (i.e., 0 = *did not endorse reason for consumption of*

caffeinated alcohol, 1 = *did endorse reason for consumption*). Results revealed that

greater anxiety symptoms predicted greater likelihood of using caffeinated alcohol to feel

more physical vigor and to reduce fear, anxiety, or avoidance. Anxiety also was

significantly negatively related to likelihood of using caffeinated alcohol because of a

taste preference. Anxiety was unrelated to using caffeinated alcohol to hide the flavor of alcohol, feel less drunk, increase happiness, feel euphoric, feel less inhibited, drink more without appearing drunk, to avoid a hangover, and to reduce stress. Findings are presented in Table 15.

Table 15

Simple Logistic Correlations of Anxiety Predicting Likelihood of Endorsing Reasons for

Caffeinated Alcohol Consumption

Regression Outcomes	B	SE	Wald	df	p	Odds Ratio	95% C.I.
To hide the flavor of alcohol	-0.01	0.02	0.24	1	.624	0.99	[0.96, 1.02]
To feel less drunk	0.00	0.03	0.00	1	.990	1.00	[0.94, 1.07]
To increase happiness	0.03	0.02	3.33	1	.068	1.03	[1.00, 1.06]
To feel euphoric	0.01	0.02	0.05	1	.817	1.01	[0.97, 1.04]
To feel less inhibited	0.04	0.02	2.32	1	.128	1.04	[0.99, 1.08]
To feel more physical vigor	0.05	0.02	6.58	1	.010*	1.05	[1.01, 1.10]
To drink more without appearing drunk	0.02	0.02	0.60	1	.440	1.02	[0.98, 1.05]
To avoid a hangover	0.01	0.03	0.19	1	.665	1.01	[0.96, 1.06]
To reduce stress	-0.03	0.02	2.22	1	.136	0.97	[0.93, 1.01]
To reduce fear, anxiety, or avoidance	0.10	0.004	6.37	1	.012*	1.10	[1.02, 1.19]
To increase energy or stay awake	0.02	0.03	0.18	1	.672	1.02	[0.95, 1.09]
Taste preference	-0.14	0.06	5.50	1	.019*	0.87	[0.77, 0.98]
Only beverage available	0.02	0.05	0.24	1	.625	1.02	[0.94, 1.12]
Other[a]	-0.03	0.06	0.30	1	.586	0.97	[0.87, 1.08]

[a] "Other" includes drinking caffeinated alcohol to pre-game, get drunk faster, to try something new, and to reduce tension.

CHAPTER IV

DISCUSSION

The present study represented the first to examine the association between anxiety and caffeinated alcohol use, particularly in a college student sample. Overall, it was predicted that higher anxiety would be predictive of greater caffeinated alcohol use (in a continuous and dichotomous relationship) and that higher anxiety and caffeinated alcohol consumption would be predictive of more negative consequences (e.g., alcohol-related problems, risky behaviors, additional substance use). I also hypothesized that avoidance coping would explain the relationships between anxiety and caffeinated alcohol use as well as between anxiety and alcohol-related problems. Finally, I predicted that anxiety would be related to reports of using caffeinated alcohol to reduce fear, anxiety, and stress.

Anxiety and Caffeinated Alcohol Use

The first aim of the present study was to examine the relationship between caffeinated alcohol use and anxiety symptomology. As previous alcohol literature generally has indicated positive associations between anxiety and alcohol use, it was hypothesized that those with greater anxiety symptoms would (1) be more likely to consume caffeinated alcohol at all (during a typical week in the past three months) and (2) report greater caffeinated alcohol consumption. Findings indicated that, after controlling for alcohol-only use, anxiety was unrelated to likelihood of consuming caffeinated alcohol in a dichotomous relationship. Results also suggested that anxiety was unrelated to caffeinated alcohol outcomes when measured continuously.

This null finding may reflect the mixed research examining the relationship between anxiety and caffeine use. Caffeine has been shown to produce symptoms of

anxiety, which could increase caffeine sensitivity in individuals who already experience anxiety (Boulenger et al., 1984; Lee et al., 1984). Thus, some individuals with greater trait anxiety have been shown to reduce their caffeine intake to avoid increased anxiety (Hire, 1978; Lee et al., 1984). On the contrary, other research has shown that those higher in trait anxiety do not differ in caffeine consumption as compared to individuals with lower anxiety (Boulenger et al., 1984; Holle et al., 1995). Therefore, it is possible that anxiety was unrelated to caffeinated alcohol use in the present study because of the mixed relationship between anxiety and caffeine consumption.

Anxiety, Caffeinated Alcohol Use, and Risky Outcomes

Alcohol-related problems. The second aim of the present study was to examine the influence of anxiety on the relationship between caffeinated alcohol use variables and alcohol-related problems. As both anxiety and caffeinated alcohol use have been separately shown to predict alcohol-related problems (e.g., O'Brien et al., 2008; Robinson et al., 2009), it was hypothesized that anxiety would increase the strength of the positive relationship between caffeinated alcohol use behaviors and alcohol-related problems. Although caffeinated alcohol use (i.e., binge frequency) and anxiety were uniquely associated with alcohol-related problems, the current findings did not support the hypothesis. That is, anxiety did not affect the relationship between caffeinated alcohol use and alcohol-related problems. This null finding could be a reflection of the weak relationship between anxiety and caffeinated alcohol use. The possible reasons for differences in caffeinated alcohol use will be discussed later in this section. Overall, these results may suggest that although both anxiety and caffeinated alcohol use predicted

alcohol-related problems, their lack of an association with each other may have impacted their lack of combined prediction on problems as well.

Risky behaviors. The third study aim was to test the influence of anxiety on the association between caffeinated alcohol use and risk behaviors (i.e., sexual risk behaviors, risky driving). It was hypothesized that anxiety would moderate the relationship between caffeinated alcohol use and risky driving as well as the relationship between caffeinated alcohol use and sexual risk-taking. The results did not support this hypothesis. That is, anxiety did not influence the relationship between caffeinated alcohol use and risky outcomes.

Although anxiety symptomology did not moderate the relationships between caffeinated alcohol use and risk behaviors, I examined the correlations between anxiety and risky outcomes to further understand the individual relationships. When examining the bivariate relationship just between anxiety and risky driving, however, higher trait anxiety was positively related to risky driving. Previous research has suggested that individuals with internalizing problems (e.g., anxiety) tend to engage in more problem or risk-taking behaviors (e.g., Cooper, Wood, Orcutt, & Albino, 2003) as a means of avoiding negative emotions. This finding is also consistent with Shahar (2009) who found a positive relationship between higher trait anxiety and risky driving behaviors.

Regarding the association between anxiety and risky sexual behaviors, findings showed that higher anxiety predicted greater sexual risk-taking. Only a few studies have examined sexual risk behaviors in relation to anxiety and most have found a lack of relationship (e.g., Kalichman & Weinhardt, 2001). The present results may reflect taking sexual risks as a means of avoiding dealing with stress (Cooper et al., 2003). Given the

current findings and limited previous research on anxiety and risk behaviors, it may be important for future research to further investigate these associations.

Caffeinated alcohol use was unrelated to both risky driving and sexual risk behaviors after controlling for typical alcohol use. These results are inconsistent with previous research findings that individuals who use more caffeinated alcohol are more likely to engage in risky behaviors (Brache & Stockwell, 2011; O'Brien et al., 2008; Thombs et al., 2010, 2011; Woolsey et al., 2010). Research has suggested that caffeinated alcohol use is related to engagement in risky behaviors because caffeinated alcohol use not only impairs the consumer's judgment, but also reduces their perceived level of inhibition. The findings in the current study also were inconsistent with problem behavior theory (Jessor & Jessor, 1977). This theory proposes that engaging in one risky behavior could be linked to a co-occurrence with other risky behaviors. Given the research suggesting caffeinated alcohol use can be a risky substance (e.g., O'Brien et al., 2008), problem behavior theory would suggest that consumers should be more likely to engage in other risky behaviors, such as sexual-risk taking and risky driving.

The discrepancy of the current findings with previous research may be related to differences in sample size, measurement, and the type of observation involved. For example, regarding sexual risk measurement, O'Brien and colleagues (2008) asked participants if in the past 30 days they had: (1) "been taken advantage of sexually" or (2) "taken advantage of someone sexually" as a result of drinking. The present study, however, used an overall sexual risk behavior measurement that consisted of broad questions regarding sexual risk behaviors (e.g., number of sexual partners, having intercourse without using protection, having intercourse with a partner they didn't know

well). Thus, it may be that greater consumers of caffeinated alcohol may not engage in more sexual risk behaviors overall, but are more specifically at risk for being taken advantage of sexually or taking advantage of someone sexually. Only a handful of studies have examined caffeinated alcohol use and risky driving, though, and only two studies have examined caffeinated alcohol use and sexual risk-taking. As there are some inconsistencies between the present study, past research, and theoretical accounts, more research may be needed to resolve the discrepancies.

Drug use. The fourth aim of the present study was to examine the impact of anxiety on the association between use of caffeinated alcohol and other drugs (e.g., stimulants, depressants, tobacco). Findings indicated that anxiety influenced the relationship between caffeinated alcohol use (i.e., quantity, binge frequency) and stimulant drug use, but the interactive effect was negative. That is, among individuals who reported greater anxiety symptoms, consuming more caffeinated alcohol was either unrelated to stimulant use (for caffeinated alcohol use quantity) or negatively related to decreased stimulant use (for caffeinated alcohol use binge frequency). However, for individuals reporting lower anxiety symptoms, consuming more caffeinated alcohol was related to increased stimulant drug use. The results were consistent when psychedelic drug use was examined as an outcome. That is, anxiety moderated the relationship between caffeinated alcohol use quantity and psychedelic drug use such that for those higher in anxiety, caffeinated alcohol use predicted a decrease in psychedelic drug use, but for those lower in anxiety, quantity was not associated with psychedelic drug use. Anxiety did not influence the relationship between caffeinated alcohol use and tobacco use or any other drug use outcome. Overall, these results suggest that consuming more

caffeinated alcohol appears to be a greater concern for those lower in anxiety symptoms as compared to those with higher levels.

Regarding bivariate associations between anxiety and drug use, it is important to note that anxiety was unrelated to stimulant and psychedelic drug use, but was predictive of other drug use (i.e., depressants, marijuana, opiates, steroids). This may suggest that anxiety symptoms act as a protective factor against stimulant use. This finding is consistent with previous research that suggests anxious individuals may not use caffeine because of its anxiety-provoking effects (Boulenger et al., 1984; Lee et al., 1984). Although the average college student is reportedly using caffeinated alcohol to counteract alcohol's sedative effects (Marczinski, 2011), perhaps individuals higher in anxiety have different motivations for consuming caffeinated alcohol. Conversely, maybe those who are lower in anxiety have a positive relationship between caffeinated alcohol use and drug use because of their lack of worry and concern about potential negative consequences (Goldsmith, Thompson, Black, Tran, & Smith, 2012). Thus, individuals higher in anxiety with potentially greater levels of worry may be less likely to engage in other drug use (i.e., stimulants and psychedelic drugs).

Only a handful of studies have specifically examined the link between anxiety and drug use. These have produced mixed results. Some have found that individuals higher in trait anxiety will use more drugs (e.g., alcohol, marijuana, hallucinogens, opiates) overall (e.g., de Moja, 1990; Taylor & del Pilar, 1992), while others have indicated that higher anxiety predicts lower drug use, aside from alcohol, marijuana (Hobfoll & Segal, 1983), and sometimes smoking (Pritchard & Kay, 1993; Waal-Manning & Hamel, 1978; Williams, Hudson, & Redd, 1982). The positive relationship found in the present study

between anxiety and drugs, such as depressants, marijuana, and opiates, may indicate that those with higher anxiety may attempt to manage their anxiety by using drugs that counteract their symptoms.

Only one study to date has examined the association between caffeinated alcohol use and drug use. Brache and Stockwell (2011) found that caffeinated alcohol consumers were more likely to use stimulants (e.g., cocaine, amphetamine) than individuals who did not report consuming caffeinated alcohol in the past year. The present study examined a broader range of drugs and found that caffeinated alcohol use was not related to stimulant drug use but was negatively associated with inhalant use. Additionally, frequency of binge drinking caffeinated alcohol predicted cigarette use quantity. Given the associations of caffeinated alcohol use and stimulant drug use noted in previous research (Brache & Stockwell, 2011), the positive relationship between caffeinated alcohol use and smoking also may represent a concern. The bivariate relationships in the present study are inconsistent with problem behavior theory (Jessor & Jessor, 1977) and previous research findings (Brache & Stockwell, 2011). Perhaps future research could attempt to replicate the findings of Brache and Stockwell.

Overall, although contrary to hypotheses that individuals with anxiety will be more susceptible to risk behaviors from consuming caffeinated alcohol, results from drug use outcomes indicate that individuals who are lower in anxiety and consume more caffeinated alcohol appear to be at a greater risk for engaging in other substance use. Anxiety may serve as a protective factor in this regard.

Anxiety and Avoidance Coping

The fifth aim of the present study was to examine avoidance coping as an underlying mechanism in the associations between anxiety and alcohol use outcomes (i.e., caffeinated alcohol use and alcohol-related problems). It was hypothesized that endorsement of avoidance coping would mediate these relationships. Consistent with previous research (e.g., Borkovec & Roemer, 1995), findings showed that individuals higher in trait anxiety were more likely to use avoidance coping mechanisms. Avoidance coping also explained the relationship between anxiety and caffeinated alcohol use outcomes as well as the relationship between anxiety and alcohol-related problems. That is, individuals experiencing symptoms of anxiety may use caffeinated alcohol to avoid dealing with stress, which could predict drinking-related negative consequences.

These results are consistent with social learning theory (SLT; Bandura, 1969, 1977; Maisto et al., 1999), which suggests that the association between anxiety and substance use may be the result of a lack of more beneficial coping strategies. Using caffeinated alcohol to cope with stress could represent a concern as this relationship may reflect a learned process. That is, if one learns that caffeinated alcohol can help them cope with symptoms of anxiety or stress, they may resort to using this substance when feeling stressed or anxious in the future. Continually using a substance as a coping mechanism could predict alcohol-related problems, such as alcohol dependence (e.g., Moos et al., 1990).

An individual's reason for using caffeinated alcohol, such as coping, may be related to anxiety in the prediction of caffeinated alcohol use outcomes (i.e., consumption levels and alcohol-related problems). That is, perhaps caffeinated alcohol use and

anxiety did not predict negative consequences in an interaction because the relationship was not contingent on the anxious individual's reason for consumption. It may be important for future researchers to examine a combined interactive effect between anxiety, caffeinated alcohol use, and avoidance coping strategies. Thus, an individual higher in anxiety may be at greater risk of experiencing alcohol-related problems if they are using caffeinated alcohol as a means of avoiding dealing with stressors.

Anxiety and Reasons for Caffeinated Alcohol Consumption

The final aim of the current study was to examine associations between anxiety and various reasons for consuming caffeinated alcohol. It was hypothesized that anxiety would be predictive of using caffeinated alcohol to reduce fear, anxiety, or avoidance as well as to reduce stress. Results indicated that anxiety predicted the likelihood of consuming caffeinated alcohol to (1) reduce fear, anxiety, or avoidance, and (2) to increase physical vigor. Anxiety was negatively associated with likelihood of using caffeinated alcohol because of a taste preference. Using caffeinated alcohol to reduce fear, anxiety, or avoidance is consistent with the hypothesis and mediation analyses. Overall, results suggest that anxiety symptom severity may be related to having more positive reasons for consuming caffeinated alcohol.

It is important to note that although individuals higher in anxiety may have positive beliefs about caffeinated alcohol, the findings of the current study indicate that anxiety is unrelated to caffeinated alcohol use after controlling for typical alcohol use. This finding may be indicative of these individuals having more positive beliefs regarding the effects of alcohol rather than having specific, positive beliefs about caffeinated alcohol. For example, findings from the alcohol expectancy literature have

shown that individuals higher in trait anxiety have more positive beliefs or greater expectations of alcohol's behavioral effects including expectations of global, positive changes from alcohol, sexual enhancement, social assertion, arousal (Brown & Munson, 1987) and tension-reduction effects (Goldsmith et al., 2012; Goldsmith, Tran, Smith, & Howe, 2009; Kushner, Sher, Wood, & Wood, 1994). These findings led me to further explore the interplay between alcohol expectancies and caffeinated-alcohol use among those with anxiety. Preliminary analyses (Linden, Lau-Barraco, & D'Lima, accepted) revealed that anxiety is related to having global, positive beliefs about alcohol which, in turn, predicted greater caffeinated alcohol use. These findings, combined with the findings of the current study, suggest that it may be important for future research to further explore the association between anxiety, caffeinated alcohol use, and other alcohol expectancies, such as tension reduction expectancies.

Future Directions

In order to truly understand the relationship between anxiety and caffeinated alcohol use, it may be important to examine factors that influence this association. Given that both avoidance coping and positive alcohol expectancies separately explain the relationship between anxiety and caffeinated alcohol use, it may be useful to examine the combined effects of coping and alcohol expectancies on the relationship between anxiety and caffeinated alcohol consumption. Previous research examined the interactive effects of expectancies and coping motivations among individuals with varying levels of psychological distress. Overall, it was found that individuals with higher stress more strongly endorsed positive alcohol expectancies and also were more likely to drink to cope (Williams & Clark, 1998). Similarly, Cooper, Skinner, Frone, and Mudar (1992)

found that avoidance coping was significantly related to greater positive expectancies. Additionally, individuals with greater stress had greater positive expectancies regarding alcohol and avoidant coping strategies, both of which predicted greater alcohol use. Thus, it may be useful to examine the effects of avoidance coping and positive alcohol expectancies on the association between anxiety and caffeinated alcohol use.

It is important to mention that individuals who were lower in anxiety had positive associations between caffeinated alcohol consumption and smoking behaviors. Although anxiety is often positively related to alcohol use (e.g. Robinson et al., 2009), some research has shown that at times anxiety is unrelated to alcohol use (e.g., Goldsmith et al., 2012). This relationship may reflect higher anxiety sometimes serving as a protective factor against drinking or smoking. That is, individuals higher in anxiety typically experience greater, sometimes excessive, levels of worry, which may prevent them from consuming caffeinated alcohol and from smoking. For those lower in anxiety, however, they likely worry much less and may not think about the consequences of their actions or see engaging in risky behaviors as a problem. Therefore, caffeinated alcohol consumers lower in anxiety actually may be more vulnerable for engaging in risky behaviors. Examining caffeinated alcohol use among individuals who are lower in anxiety may be an important avenue for future research.

Outside the realm of anxiety, future research may benefit from further exploration of caffeinated alcohol use and negative consequences. For example, it may be useful to assess the context in which caffeinated alcohol is consumed. Using a daily diary method, it may be possible to explore the context in which young adults drank (e.g., at a party, when they were alone, while pre-gaming), the friends with whom they drank, the types of

beverages their friends were consuming, their expectations of or motivations for drinking prior to consumption, and any consequences experienced as a result of drinking. At present, only field research (Thombs et al., 2010, 2011) has explored the context of caffeinated alcohol consumer drinking, particularly at a bar. These studies, however, did not examine risk factors or examine the influence of alcohol-related beliefs or specific motivations for drinking. Thus, exploration of additional risky behaviors and cognitive factors that play into decision-making may be an important avenue for future research.

Limitations

There are several methodological limitations that should be noted. First, given the prevalence of caffeinated alcohol consumption on college campuses, college students were the main population of interest for the present study. However, findings may be limited in generalizing to other populations that may consume caffeinated alcohol (e.g., adolescents), as well as individuals diagnosed with clinical levels of generalized anxiety disorder.

The cross-sectional design of this study prevents us from making any causal inferences. That is, we cannot ascertain that having more anxiety symptoms leads to greater caffeinated alcohol use, or that consuming caffeinated alcohol leads to risky behaviors. As the present study demonstrated that caffeinated alcohol use predicts alcohol-related problems and smoking behavior, future research may benefit from utilizing a longitudinal design in which caffeinated alcohol use and negative consequences can be examined over time.

Although the present study included enough people to achieve the pre-determined desired level of power, there were not many smokers and there was a limited range of

consumption of caffeinated alcohol. These factors may have prevented us from observing smaller effects. Past research has typically used many more (N ranging from 460 to 700) caffeinated alcohol consumers, which may have enabled them to determine more associations. Finally, the error of only including the two response options for the motivations for drinking (i.e., drinking caffeinated alcohol to reduce stress; to reduce fear, anxiety, or avoidance) may have limited us from seeing the true effect, as only 32% of caffeinated alcohol consumers were able to respond to each item. The finding that one of the response options was still significant, however, may indicate a salient finding for individuals higher in anxiety.

CHAPTER V

CONCLUSIONS

The present study represented the first to examine the associations between caffeinated

alcohol use and anxiety. This study examined the influence of anxiety on the

relationships between caffeinated alcohol use and negative consequences. Avoidance

coping was examined as a mediator of anxiety and alcohol use outcomes. It also was of

interest to examine the relationship between anxiety and reasons for consuming

caffeinated alcohol. Overall, findings revealed that although anxiety was unrelated to

caffeinated alcohol consumption, avoidance coping acted as an underlying mechanism in

this relationship. Anxiety generally did not impact the association between caffeinated

alcohol use and negative alcohol consequences. Anxiety was related to having more

positive reasons for using caffeinated alcohol, such as using to feel more physical vigor,

and to reduce fear, anxiety, and stress. Future research may benefit from determining the

expectancies, motivations, and contexts that underline caffeinated alcohol consumption

and associated consequences in the general college student population.

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APPENDIX A

DEMOGRAPHIC QUESTIONNAIRE

1) How old are you?

_____

2) What is your student class (circle one)?
a. Freshman
b. Sophomore
c. Junior
d. Senior
e. Graduate student
f. Other (please specify): _____

3) What is your gender?
a. Female
b. Male

4) What is your living situation?
a. On-campus
b. Off-campus

5) What is your race?
a. African American/Black
b. Caucasian/White
c. Asian
d. Hispanic
e. Native Hawaiian or Other Pacific Islander
f. Native American or Alaskan Native
g. Other (please specify): _____

6) Are you currently a member of a fraternity or sorority on campus?
a. Yes
b. No

7) What is your height?
_____ feet, _____ inches

8) What is your weight?
_____ pounds

9) Yearly Individual Income:
a. Under $10,000
b. $10,000 - $20,000

c. $20,001 - $40,000
d. $40,001 - $60,000
e. $60,001 - $80,000
f. $80,000 - $100,000
g. $100,000 or more

10) What is your relationship status?
a. Single/never married
b. Living with partner
c. Married
d. Separated/Divorced
e. Widowed

11) Are you employed now?
a. Yes, part-time only
b. Yes, full and part-time
c. Yes, full time only
d. No

12) What is your current overall GPA?

_____

APPENDIX B

ALCOHOL USE (NON-CAFFEINATED ALCOHOL) QUESTIONNAIRE

The following questions have to do with non-caffeinated alcohol use. For these questions, please choose the answer that best describes your drinking in the **past 3 months**.

Note: 1 Drink = 1 Beer (12 ounces)
                 1 Wine Cooler (12 ounces)
                 1 Glass of Wine (5 ounces)
                 1 Shot of Liquor (1 to 1.5 ounces)
                 1 Non-caffeinated Mixed Drink (1 to 1.5 ounces of liquor)
                 1 Malt Liquor (12 ounces) – e.g., Mike's Hard Lemonade, Skyy Blue, Zima, Smirnoff Ice, etc.

1. Please think about your typical drinking over the **PAST 3 MONTHS NOT INCLUDING CAFFEINATED ALCOHOL**. On a typical day, how many drinks would you have, and over how many hours would you have them? That is, how many drinks would you typically have on each day in the past three months? How long (in hours) would a typical drinking occasion last on that day?

Over the PAST 3 MONTHS, on a....

	TYPICAL MONDAY	TYPICAL TUESDAY	TYPICAL WEDNESDAY	TYPICAL THURSDAY	TYPICAL FRIDAY	TYPICAL SATURDAY	TYPICAL SUNDAY
NUMBER OF DRINKS							
NUMBER OF HOURS							

APPENDIX C

CAFFEINE USE QUESTIONNAIRE

The following questions have to do with caffeine (non-alcoholic) use. For these questions, please choose the answer that best describes your drinking in the **past 3 months**.

> Note: Caffeine can include: Tea (hot or cold), coffee, soda, energy drinks
> 1 Beverage = 12 oz.
> 12 oz = Starbucks "tall" coffee or can of soda
> 16 oz = Starbucks "grande"
> 20 oz. = Starbucks "vente" or plastic bottle of soda

1. Please think about your typical caffeine consumption over the **PAST 3 MONTHS**. On a typical day, how many caffeinated beverages would you have, and over how many hours would you have them? That is, how many beverages would you typically have on each day in the past three months? How long (in hours) would a typical occasion last on that day? **In the third row, indicate if you consumed an energy drink specifically (e.g., Red Bull, Monster, Rockstar) on this day.**

Over the PAST 3 MONTHS, on a....

	TYPICAL MONDAY	TYPICAL TUESDAY	TYPICAL WEDNESDAY	TYPICAL THURSDAY	TYPICAL FRIDAY	TYPICAL SATURDAY	TYPICAL SUNDAY
NUMBER OF DRINKS							
NUMBER OF HOURS							
CONSUMED ENERGY DRINK? (YES/NO)							

APPENDIX D

CAFFEINATED ALCOHOL USE QUESTIONNAIRE

The following questions have to do with caffeinated alcohol use. For these questions, please choose the answer that best describes your drinking in the **past 3 months**.

> Note: 1 Drink = 1 Energy drink with alcohol (e.g., Red Bull and Vodka; Jager Bomb)
> = 1 Pre-packaged caffeinated alcohol (e.g., Caffeinated beer: Sparks, Rockstar; caffeinated liquor – Joose or P.I.N.K.)
> = 1 Coffee with alcohol (e.g., Irish Coffee)

Please think about your typical drinking of caffeinated alcohol over the **PAST 3 MONTHS**. On a typical day, how many drinks would you have, and over how many hours would you have them? That is, how many drinks would you typically have on each day in the past three months? How long (in hours) would a typical drinking occasion last on that day? **In the third row, indicate if you consumed an energy drink specifically (e.g., Red Bull, Monster, Rockstar) on this day.**

Over the PAST 3 MONTHS, on a....

	TYPICAL MONDAY	TYPICAL TUESDAY	TYPICAL WEDNESDAY	TYPICAL THURSDAY	TYPICAL FRIDAY	TYPICAL SATURDAY	TYPICAL SUNDAY
NUMBER OF DRINKS							
NUMBER OF HOURS							
CONSUMED ENERGY DRINK? (YES/NO)							

APPENDIX E

DRUG USE HISTORY QUESTIONNAIRE

Please indicate how often you have used each of the following substances over the **PAST 12 MONTHS** by placing a check in the appropriate box. Choose only ONE response for each substance.

	Everyday	Weekly	Monthly	< Once a month	Never
Alcohol					
Marijuana (pot, grass, hashish)					
Opiates (heroin, morphine, Demerol, codeine)					
Caffeine (soda, coffee)					
Barbiturates (downers, sleeping pills)					
"Club" Drugs (Ecstasy, GHB, Special K)					
Tobacco (Cigarettes, cigars, chew)					
Tranquilizers (Valium, Librium, Xanax)					
Cocaine (powder form)					
Crack					
Amphetamines (meth, uppers, speed)					
Steroids					
Inhalants					
Psychedelics (LSD, mescaline, peyote)					
Other prescription drugs NOT prescribed to you					

APPENDIX F

TOBACCO USE SURVEY

These questions are about your use of tobacco products. This includes cigarettes.

Cigarettes
These questions are about your cigarette use.

1. During the past 30 days, on how many days did you smoke part or all of a cigarette? _____
2. On the days you smoked cigarettes during the past 30 days, how many cigarettes did you smoke per day, on average?
   a. Less than one cigarette per day
   b. 1 cigarette per day
   c. 2 to 5 cigarettes per day
   d. 6 to 15 cigarettes per day (about ½ pack)
   e. 16 to 25 cigarettes per day (1 pack)
   f. 26 to 35 cigarettes per day (about 1 ½ packs)
   g. More than 35 cigarettes per day (about 2 packs or more)
   h. I did not smoke cigarettes in the past 30 days
3. Have you smoked at least 100 cigarettes in your entire life?
   a. Yes
   b. No
4. How long has it been since you last smoked part or all of a cigarette?
   a. I have never smoked cigarettes
   b. I have smoked cigarettes during the past 30 days
   c. I have smoked cigarettes more than 30 days ago but within the past 12 months
   d. I have smoked cigarettes more than 12 months ago but within the past 3 years
   e. I have smoked cigarettes more than 3 years ago

APPENDIX G

SPIELBERGER STATE-TRAIT ANXIETY INVENTORY

Instructions: A number of statements which people have used to describe themselves are given below. Read each statement and then circle the appropriate number to the right of the statement to indicate how you *generally* feel. There are not right or wrong answers. Do not spend too much time on any one statement but give the answer that seems to describe how you generally feel.

	Almost Never	Sometimes	Often	Almost Always
1. I feel pleasant	1	2	3	4
2. I feel nervous and restless	1	2	3	4
3. I feel satisfied with myself	1	2	3	4
4. I wish I could be as happy as others seem to be	1	2	3	4
5. I feel like a failure	1	2	3	4
6. I feel rested	1	2	3	4
7. I am "calm, cool, and collected"	1	2	3	4
8. I feel that difficulties are piling up so that I cannot overcome them	1	2	3	4
9. I worry too much over something that really doesn't matter	1	2	3	4
10. I am happy	1	2	3	4
11. I have disturbing thoughts	1	2	3	4
12. I lack self-confidence	1	2	3	4
13. I feel secure	1	2	3	4
14. I make decisions easily	1	2	3	4
15. I feel inadequate	1	2	3	4
16. I am content	1	2	3	4
17. Some unimportant thought runs through my mind and bothers me	1	2	3	4
18. I take disappointments so keenly that I can't put them out of my mind	1	2	3	4
19. I am a steady person	1	2	3	4
20. I get in a state of tension or turmoil as I think over my recent concerns and interests	1	2	3	4

APPENDIX H

YOUNG ADULTS ALCOHOL CONSEQUENCES QUESTIONNAIRE

Instructions: Below is a list of things that sometimes happen to people either during, or after they have been drinking alcohol. Next to each item below, please mark an "X" in either the YES or NO column to indicate whether that item describes something that has happened to you **IN THE PAST YEAR.**

In the **PAST YEAR...**

		NO	YES
1	While drinking, I have said or done embarrassing things.		
2	The quality of my work or schoolwork has suffered because of my drinking.		
3	I have felt badly about myself because of my drinking.		
4	I have driven a car when I knew I had too much to drink to drive safely.		
5	I have had a hangover (headache, sick stomach) the morning after I had been drinking.		
6	I have passed out from drinking.		
7	I have taken foolish risks when I have been drinking.		
8	I have felt very sick to my stomach or thrown up after drinking.		
9	I have gotten into trouble at work or school because of drinking.		
10	I often drank more than I originally had planned.		
11	My drinking has created problems between myself and my boyfriend/girlfriend/spouse, parents, or other near relatives.		
12	I have been unhappy because of my drinking.		
13	I have gotten into physical fights because of drinking.		
14	I have spent too much time drinking.		
15	I have not gone to work or missed classes at school because of drinking, a hangover, or illness caused by drinking.		
16	I have felt like I needed a drink after I'd gotten up (that is, before breakfast).		
17	I have become very rude, obnoxious or insulting after drinking.		
18	I have felt guilty about my drinking.		
19	I have damaged property, or done something disruptive such as setting off a false fire alarm, or other things like that after I had been drinking.		
20	Because of my drinking, I have not eaten properly.		

21	I have been less physically active because of drinking.		
22	I have had "the shakes" after stopping or cutting down on drinking (eg., hands shake so that coffee cup rattles in the saucer or have trouble lighting a cigarette).		
23	My boyfriend/girlfriend/spouse/parents have complained to me about my drinking.		
24	I have woken up in an unexpected place after heavy drinking.		
25	I have found that I needed larger amounts of alcohol to feel any effect, or that I could no longer get high or drunk on the amount that used to get me high or drunk.		
26	As a result of drinking, I neglected to protect myself or my partner from a sexually transmitted disease (STD) or an unwanted pregnancy.		
27	I have neglected my obligations to family, work, or school because of drinking.		
28	I often have ended up drinking on nights when I had planned not to drink.		
29	When drinking, I have done impulsive things that I regretted later.		
30	I have often found it difficult to limit how much I drink.		
31	My drinking has gotten me into sexual situations I later regretted.		
32	I've not been able to remember large stretches of time while drinking heavily.		
33	While drinking, I have said harsh or cruel things to someone.		
34	Because of my drinking I have not slept properly.		
35	My physical appearance has been harmed by my drinking.		
36	I have said things while drinking that I later regretted.		
37	I have awakened the day after drinking and found that I could not remember a part of the evening before.		
38	I have been overweight because of drinking.		
39	I haven't been as sharp mentally because of my drinking.		
40	I have received a lower grade on an exam or paper than I ordinarily could have because of my drinking.		
41	I have tried to quit drinking because I thought I was		

	drinking too much.		
42	I have felt anxious, agitated, or restless after stopping or cutting down on drinking.		
43	I have not had as much time to pursue activities or recreation because of drinking.		
44	I have injured someone else while drinking or intoxicated.		
45	I often have thought about needing to cut down or stop drinking.		
46	I have had less energy or felt tired because of my drinking.		
47	I have had a blackout after drinking heavily (i.e., could not remember hours at a time).		
48	Drinking has made me feel depressed or sad.		

APPENDIX I

THE COPE INVENTORY

We are interested in how people respond when they confront difficult or stressful events in their lives. There are lots of ways to try to deal with stress. This questionnaire asks you to indicate what you generally do and feel, when you experience stressful events. Obviously, different events bring out somewhat different responses, but think about what you usually do when you are under a lot of stress.

Then respond to each of the following items by blackening one number on your answer sheet for each, using the response choices listed just below. Please try to respond to each item separately in your mind from each other item. Choose your answers thoughtfully, and make your answers as true FOR YOU as you can. Please answer every item. There are no "right" or "wrong" answers, so choose the most accurate answer for YOU – not what you think "most people" would say or do. Indicate what YOU usually do when YOU experience a stressful event.

	I usually don't do this at all	I usually do this a little bit	I usually do this a medium amount	I usually do this a lot
1. I try to grow as a person as a result of the experience	1	2	3	4
2. I turn to work or other substitute activities to take my mind off things	1	2	3	4
3. I get upset and let my emotions out	1	2	3	4
4. I try to get advice from someone about what to do	1	2	3	4
5. I concentrate my efforts on doing something about it	1	2	3	4
6. I say to myself "this isn't real."	1	2	3	4
7. I put my trust in God	1	2	3	4
8. I laugh about the situation	1	2	3	4
9. I admit to myself that I can't deal with it, and quit trying	1	2	3	4

	1	2	3	4
10. I restrain myself from doing anything too quickly	1	2	3	4
11. I discuss my feelings with someone	1	2	3	4
12. I use alcohol or drugs to make myself feel better	1	2	3	4
13. I get used to the idea that it happened	1	2	3	4
14. I talk to someone to find out more about the situation	1	2	3	4
15. I keep myself from getting distracted by other thoughts or activities	1	2	3	4
16. I daydream about things other than this	1	2	3	4
17. I get upset, and am really aware of it	1	2	3	4
18. I seek God's help	1	2	3	4
19. I make a plan of action	1	2	3	4
20. I make jokes about it	1	2	3	4
21. I accept that this has happened and that it can't be changed	1	2	3	4
22. I hold off doing anything about it until the situation permits	1	2	3	4
23. I try to get emotional support from friends or relatives	1	2	3	4
24. I just give up trying to reach my goal	1	2	3	4
25. I take additional action to try to get rid of the problem	1	2	3	4
26. I try to lose myself for a while by drinking alcohol or taking drugs	1	2	3	4
27. I refuse to believe that it has happened	1	2	3	4

28. I let my feelings out	1	2	3	4
29. I try to see it in a different light, to make it seem more positive	1	2	3	4
30. I talk to someone who could do something concrete about the problem	1	2	3	4
31. I sleep more than usual	1	2	3	4
32. I try to come up with a strategy about what to do	1	2	3	4
33. I focus on dealing with this problem, and if necessary let other things slide a little	1	2	3	4
34. I get sympathy and understanding from someone	1	2	3	4
35. I drink alcohol or take drugs, in order to think about it less	1	2	3	4
36. I kid around about it	1	2	3	4
37. I give up the attempt to get what I want	1	2	3	4
38. I look for something good in what is happening	1	2	3	4
39. I think about how I might best handle the problem	1	2	3	4
40. I pretend that it hasn't really happened	1	2	3	4
41. I make sure not to make matters worse by acting too soon	1	2	3	4
42. I try hard to prevent other things from interfering with my efforts at dealing with this	1	2	3	4
43. I go to movies or watch TV, to think about it less	1	2	3	4
44. I accept the reality of the fact that it happened	1	2	3	4
45. I ask people who have had	1	2	3	4

similar experiences what they did				
46. I feel a lot of emotional distress and I find myself expressing those feelings a lot	1	2	3	4
47. I take direct action to get around the problem	1	2	3	4
48. I try to find comfort in my religion	1	2	3	4
49. I force myself to wait for the right time to do something	1	2	3	4
50. I make fun of the situation	1	2	3	4
51. I reduce the amount of effort I'm putting into solving the problem	1	2	3	4
52. I talk to someone about how I feel	1	2	3	4
53. I use alcohol or drugs to help me get through it	1	2	3	4
54. I learn to live with it	1	2	3	4
55. I put aside other activities in order to concentrate on this	1	2	3	4
56. I think hard about what steps to take	1	2	3	4
57. I act as though it hasn't even happened	1	2	3	4
58. I do what has to be done, one step at a time	1	2	3	4
59. I learn something from the experience	1	2	3	4
60. I pray more than usual	1	2	3	4

APPENDIX J

SEXUAL RISK SURVEY

Instructions: Please read the following statements and record the number that is true for you over the past 6 months for each question on the blank. If you do not know for sure how many times a behavior took place, try to estimate the number as close as you can. Thinking about the average number to times the behavior happened per week or per month might make it easier to estimate an accurate number, especially if the behavior happened fairly regularly. If you've had multiple partners, try to think about how long you were with each partner, the number of sexual encounters you had with each, and try to get an accurate estimate of the total number of each behavior. If the question does not apply to you or you have never engaged in the behavior in the question, put a "0" on the blank. Please do not leave items blank. Remember that in the following questions, "sex" includes oral, anal, and vaginal sex and that "sexual behavior" includes passionate kissing, making out, fondling, petting oral-to-anal stimulation, and hand-to-genital stimulation. Please consider only the last 6 months when answering and please be honest.

In the *past six months*:

	Number of times
1. How many partners have you engaged in sexual behavior with but not had sex with?	
2. How many times have you left a social event with someone you just met?	
3. How many times have you "hooked up" but not had sex with someone you didn't know or didn't know well?	
4. How many times have you gone out to bars/parties/social events with the intent of "hooking up" and engaging in sexual behavior but not having sex with someone?	
5. How many times have you gone out to bars/parties/social events with the intent of "hooking up" and having sex with someone?	
6. How many times have you had an unexpected and unanticipated sexual experience?	
7. How many times have you had a sexual encounter you engaged in willingly but later regretted?	

For the next set of questions, follow the same direction as before. However, for questions 8-23, if you have never had sex (oral, anal or vaginal), please put a "0" on each blank.

	Number of times
8. How many partners have you had sex with?	
9. How many times have you had vaginal intercourse without a latex or polyurethane condom? Note: includes times when you have used a lambskin or membrane condom.	
10. How many times have you had vaginal intercourse without protection against pregnancy?	
11. How many times have you given or received fellatio (oral sex on a man) without a condom?	
12. How many times have you given or received cunnilingus (oral sex on a woman) without a dental dam or "adequate protection"?	
13. How many times have you had anal sex without a condom?	
14. How many times have you or your partner engaged in anal penetration by a hand ("fisting") or other object without a latex glove or condom followed by unprotected anal sex?	
15. How many times have you given or received analingus (oral stimulation of the anal region, "rimming") without a dental dam or "adequate protection"?	
16. How many people have you had sex with that you know but are not involved in any sort of relationship with (i.e., "friends with benefits", "fuck buddies")?	
17. How many times have you had sex with someone you don't know well or just met?	
18. How many times have you or your partner used alcohol or drugs before or during sex?	
19. How many times have you had sex with a new partner before discussing sexual history, IV drug use, disease status and other current sexual partners?	
20. How many times (that you know of) have you had sex with someone who has had many sexual partners?	
21. How many partners (that you know of) have you had sex with who had been sexually active before you were with them but had not been tested for STIs/HIV?	
22. How many partners have you had sex with that you didn't trust?	
23. How many times (that you know of) have you had sex with someone who was also engaging in sex with others during the same time period?	

APPENDIX K

DULA'S DANGEROUS DRIVING INDEX

Instructions: Please answer each of the following items as *honestly* as possible. Please read each item carefully and then fill in the bubble/circle of the answer you choose on the form. If none of the choices seem to be your ideal answer, then select the answer that comes *closest*. THERE ARE NO RIGHT OR WRONG ANSWERS. Select your answers quickly and do not spend too much time analyzing your answers. You may change any answer(s) at any time before completing this form. If you do change an answer, please erase the previous mark(s) entirely.

	Never	Rarely	Sometimes	Often	Always
1. I drive when I am angry or upset	0	1	2	3	4
2. I lose my temper when driving	0	1	2	3	4
3. I consider the actions of other drivers to be inappropriate or "stupid"	0	1	2	3	4
4. I flash my headlights when I am annoyed by another driver	0	1	2	3	4
5. I make rude gestures (e.g., giving "the finger," yelling curse words) toward drivers who annoy me	0	1	2	3	4
6. I verbally insult drivers who annoy me	0	1	2	3	4
7. I deliberately use my car/truck to block drivers who tailgate me	0	1	2	3	4
8. If another driver *seriously* threatens my safety, I would defend myself	0	1	2	3	4
9. I would tailgate a driver who annoys me	0	1	2	3	4
10. I "drag race" other drivers at stop lights to get out front	0	1	2	3	4

	0	1	2	3	4
11. I will illegally pass a car/truck that is going *too* slowly	0	1	2	3	4
12. I feel it is my right to strike back in some way, if I feel another driver has been aggressive toward me	0	1	2	3	4
13. When I get stuck in a traffic jam, I get *very* irritated	0	1	2	3	4
14. I will race a slow moving train to a railroad crossing	0	1	2	3	4
16. I will drive if I am only *mildly* intoxicated or buzzed.	0	1	2	3	4
17. When someone cuts me off, I feel I should punish him/her	0	1	2	3	4
18. I get impatient and/or upset when I fall behind schedule when I am driving	0	1	2	3	4
19. Passengers in my car/truck tell me to calm down	0	1	2	3	4
20. I get irritated when a car/truck in front of me slows for no reason	0	1	2	3	4
21. I will cross double yellow lines to see if I can pass a slow moving car/truck	0	1	2	3	4
22. I feel it is my right to get where I need to go as quickly as possible	0	1	2	3	4
23. I am an aggressive driver	0	1	2	3	4
24. I feel that *passive* drivers should learn how to drive or stay home	0	1	2	3	4

25. I keep some type of weapon in my car/truck	0	1	2	3	4
26. I will drive in the shoulder lane or median to get around a traffic jam	0	1	2	3	4
27. When passing a car/truck on a 2-lane road, I will barely miss on-coming cars	0	1	2	3	4
28. I will drive when I am drunk	0	1	2	3	4
29. I feel that I may lose my temper if I have to confront another driver	0	1	2	3	4
30. I consider myself to be a risk-taker	0	1	2	3	4
31. I feel that most traffic "laws" could be considered as suggestions	0	1	2	3	4

APPENDIX L

REASONS FOR CONSUMING CAFFEINATED ALCOHOL

Why do you consume caffeinated alcoholic beverages? These can include alcohol mixed energy drinks (e.g., Red Bull and vodka) or pre-mixed caffeinated alcoholic drinks (e.g., Joose). Select all that apply.

a. To hide the flavor of alcohol
b. To feel less drunk
c. Increase happiness
d. Feel euphoric
e. Feel less inhibited
f. Feel more physical vigor
g. To drink more without appearing drunk
h. So I won't get a hangover
i. To reduce stress
j. To reduce fear, anxiety, or avoidance
k. Other (please specify): _____

VITA

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Education and Training

M.S.   **Old Dominion University**, *Norfolk, VA*
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Background

Ashley N. Linden is a second year graduate student at Old Dominion University. She is pursuing her Master's degree in Experimental Psychology and, in Fall 2012, her Ph.D. in Applied Experimental Psychology. She currently serves as the project coordinator for Dr. Cathy Lau-Barraco's K01 career grant funded by the National Institutes of Health. Ashley's research interests rest primarily in substance use and mental health outcomes.

Selected Presentations

Linden, A.N., D'Lima, G., & Lau-Barraco, C. (accepted). Caffeinated alcohol and negative consequences: Are caffeine expectancies a mediator? Poster to be presented at the Association for Behavioral and Cognitive Therapies.

Linden, A.N., Hollis, B.F., & Lau-Barraco, C. (accepted). Depressive symptoms and alcohol consumption: Perceived norms as a mediator. Poster to be presented at the annual meeting of the American Psychological Association.

Linden, A.N., Lau-Barraco, C., Braitman, A.L., & Hollis, B. (2011, November). Perceived norms and drinking motives as predictors of alcohol outcomes among socially anxious college students. Poster presented at the annual meeting of the Association for Behavioral and Cognitive Therapies, Toronto, Canada.