

THE ROLE OF DRINKING TO COPE IN IMPACTING
ALCOHOL-RELATED BEHAVIOURS AND OUTCOMES
AMONG UNDERGRADUATE STUDENTS

by

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ABSTRACT

This dissertation focused on understanding the role of coping motives in alcohol behaviours and outcomes among undergraduates in a series of three studies. Study 1 examined the effects of drinking motives and induced mood states on lab-based alcohol consumption among 81 undergraduates. Results revealed that socially motivated (SM) drinkers consumed more alcohol when a positive, compared to an anxious, mood was induced. However, coping with anxiety motivated (CAM) drinkers did not show the hypothesized preference for alcohol when an anxious, compared to a positive, mood was induced. Findings indicated that while CAM drinkers did not consume more alcohol when experiencing anxiety, they also did not show the normative and healthier pattern shown by the SM drinkers of inhibiting their alcohol consumption when feeling anxious. The studies that followed focused on testing the mediational role of coping motives in explaining alcohol-related problems among individuals who experience a specific form of anxiety, namely social anxiety. Prior work suggests that socially anxious undergraduates have higher levels of alcohol-related problems. Study 2a investigated the cross-sectional role of CAM, coping with depression motives (CDM), and conformity motives in mediating the relationship between the social avoidance aspect of social anxiety and alcohol-related problems in 263 undergraduates. Results showed that CDM fully mediated this relationship. The use of a social avoidance measure, which is linked to depression, is a potential explanation for this finding. Study 2b replicated and extended Study 2a with 189 undergraduates by including coping with social anxiety motives (CSAM) as well as drinking context (i.e., personal/intimate contexts such as when on a date and negative emotional contexts such as when feeling sad or anxious) as additional mediators in a chained mediation model. Study 2b revealed that in addition to CDM, CSAM fully and independently mediated the social avoidance – alcohol-related problems relationship. Drinking contexts generally did not sequentially mediate the social avoidance – alcohol-related problems relationship, though the negative reinforcement drinking motives did predict heavier alcohol consumption in these risky contexts. This pattern of results fits with assertions that drinking motives are the final common pathway to alcohol behaviours and problems. Finally, Study 3 replicated and extended Study 2a using a longitudinal design with three bi-annual data collection waves over a period of eighteen months in 219 undergraduates. Study 3 showed that CDM mediated the prospective relationship between social avoidance and alcohol-related problems, using a superior test of mediation (i.e., explaining change over time) than that used in the cross-sectional Study 2a. Overall, the results of this dissertation shed new light on how various coping motives impact alcohol-related behaviours and outcomes among undergraduates. I found that CAM drinkers do not inhibit their alcohol intake when feeling anxious. I also showed that CDM and CSAM were the primary mediators associated with alcohol-related problems cross-sectionally among socially avoidant students. Finally, I showed that changes in CDM explained changes in alcohol-related problems over time among socially avoidant students. My findings suggest that learning to inhibit their drinking when feeling anxious may be a helpful harm reduction strategy for CAM drinkers. Moreover, providing socially avoidant university students with healthier coping strategies for their social anxiety and their associated depressive symptoms may be beneficial in reducing the alcohol-related problems that may develop over time.

LIST OF ABBREVIATIONS AND SYMBOLS USED

ANCOVA	Analysis of covariance
ANOVA	Analysis of variance
APA	American Psychiatric Association
AS	Anxiety Sensitivity
AUD	Alcohol Use Disorder
BAC	Blood Alcohol Concentration
BASICS	Brief Alcohol Screening and Intervention for College Students
CAM	Coping with Anxiety Motives
CDM	Coping with Depression Motives
CSAM	Coping with Social Anxiety Motives
DCS-R	Drinking Context Scale- Revised
DDSAQ	Drinking due to Social Anxiety Questionnaire
DSM-IV	Diagnostic and Statistical Manual of Mental Disorders
EM	Enhancement Motives
<i>F</i>	Computed value of ANOVA
FIML	Full-information maximum likelihood
GAD	Generalized Anxiety Disorder
LSAS-A	Liebowitz Social Anxiety Scale - Avoidance Subscale
<i>M</i>	Mean
M DMQ-R	Modified Drinking Motives Questionnaire - Revised
MLR	Statistical correction used in Mplus
MMIP	Musical Mood Induction Procedure
<i>n</i>	Total sample size
NIAAA	National Institute on Alcohol Abuse and Alcoholism
<i>p</i>	Probability of Type I error
PEP	Post-event processing
<i>r</i>	Pearson product-moment correlation
RAPI	Rutgers Alcohol Problems Index
RCT	Randomized control trial
SAD	Social Anxiety Disorder
<i>SD</i>	Standard Deviation
SM	Social Motives
<i>t</i>	Computed value of <i>t</i> test
VLT	Video Lottery Terminal
α	Alpha co-efficient; index of internal consistency
β	Beta weight; standardized multiple regression coefficient

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“...it matters not what someone is born, but what they grow to be.”

- Albus Percival Wulfric Brian Dumbledore

CHAPTER 1. INTRODUCTION

My dissertation research focuses on understanding the role of drinking motives, specifically negative reinforcement drinking motives, in the drinking behavior and outcomes of undergraduate student drinkers. My dissertation includes three publication-style manuscripts. Together, they represent four empirical studies that examined the effect of mood and drinking motives on laboratory alcohol consumption, the mediating role of drinking motives (i.e., coping with anxiety motives [CAM], coping with depression motives [CDM], and conformity motives) in explaining the concurrent relationship between social avoidance and alcohol-related problems, the mediating role of drinking motives (those mentioned previously as well as coping with social anxiety motives [CSAM]) and drinking context in explaining the concurrent relationship between social avoidance and alcohol-related problems, and, finally, the role of drinking motives (CAM, CDM, conformity motives, social motives, and enhancement motives) in explaining the prospective relationship between social avoidance and increases in alcohol-related problems over time. Before presenting the research findings of this dissertation, I outline the relevant theoretical and empirical background information as well as provide rationale for the current research.

University Students and Alcohol

Many university students consume alcohol in potentially problematic ways. Approximately 40% of university students engage in heavy episodic drinking, or binge drinking (Bret, Leavens, Miller, Lombardi, & Leffingwell, 2016; Ham, Bonin, & Hope, 2007; Hingson, 2010; Kuo et al., 2002), which is defined as consuming five or more drinks in one sitting for men, and four or more drinks for women (Moorhouse, Soule, Hinson, & Barnett, 2014). Even more concerning, measured over a two week period, it

has been shown that approximately 20% of male students and 10% of female students consume alcohol at twice these rates (i.e., with males consuming 10+ drinks and females consuming 8+ drinks in one sitting; White, Kraus, & Swartzwelder, 2006).

Given these high levels of risky alcohol consumption amongst this population, it is not surprising that many undergraduates endorse symptoms of alcohol abuse and/or alcohol dependence based on diagnostic criteria from the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV; American Psychiatric Association [APA], 2000¹). In one study of over 14 000 students at 119 four-year American colleges, it was found that 31% of students endorsed criteria for alcohol abuse and 6% endorsed criteria for alcohol dependence in the past year (Knight et al., 2002). Students who were frequent binge drinkers (endorsing three or more occasions of binge drinking in the past two weeks) were thirteen times more likely to be diagnosed with alcohol abuse and over nineteen times more likely to be diagnosed with alcohol dependence (Knight et al., 2002). This same study also found that university students have relatively low levels of insight into their problematic alcohol consumption, as only 4% of those with alcohol abuse and 25% of those with dependence described their drinking patterns as being “heavy” (Knight et al., 2002).

Not only do university students consume large amounts of alcohol and display high rates of alcohol use disorders, but they also experience a high number of alcohol-

¹ The DSM-5 (American Psychiatric Association, 2013) is the current standard, however, most research has been done using the DSM-IV. The primary differences for alcohol use disorder criteria include removing the distinction between abuse and dependence, removing legal problems as a criterion, and inclusion of craving as diagnostic criterion in the DSM-5.

related problems (i.e., negative consequences of alcohol use). Each year, risky alcohol consumption accounts for approximately 1800 student deaths, 124 000 sexual assaults, and 744 000 students reporting injuries due to the actions of other students who are under the influence of alcohol (Hingson, Zha, & Weitzman, 2009). It also appears that alcohol-related problems are increasing among university students, with the proportion of students who reported driving while intoxicated increasing from 26.1% in 1998 to 29.2% in 2006 (Hingson, 2010). Similarly, unintentional alcohol-related deaths increased 3% among college students aged 18-24 in this same timeframe (Hingson, 2010). Despite these high levels of alcohol consumption and alcohol-related problems, university students rarely seek treatment for these issues. In 2007, the National Institute of Alcohol Abuse and Alcoholism (NIAAA) reported that only 5% of students who meet criteria for alcohol abuse or dependence sought treatment, and Knight and colleagues (2002) found that only 6.2% of those students diagnosed with an alcohol use disorder reported seeking treatment since arriving at university.

Drinking Motives

Drinking motives are an individual's primary reasons for consuming alcohol, i.e., what motivates their alcohol use. Drinking motives are one way of differentiating distinct alcohol consumption patterns between individuals, and can provide insight into why some individuals are more susceptible than others to alcohol-related problems despite consuming similar, or even lower, levels of alcohol. Cox and Klinger (1988, 1990, 2004) originally proposed the motivational model of alcohol use, and stated that individuals drink based on the expected changes in affect, as compared to using alternative measures to achieve these changes. The key premises that underlie the motivational model are as

follows: (1) people drink to alter their moods, either through the pharmacological effects of alcohol or through a more indirect route through alcohol effects on other valued outcomes, i.e., socializing with friends, etc.; (2) individuals hold beliefs about the effects of alcohol, which impacts the motivation behind using it; (3) although the choice may not be conscious or rational, people choose whether and how much to drink in order to gain some valued outcome; and (4) different motives for alcohol use have unique patterns of antecedents, use characteristics, and consequences (Cox & Klinger, 1988).

Building on Cox and Klinger's (1988) model of substance use motives, Cooper (1994) developed the Drinking Motives Questionnaire- Revised (DMQ-R; Cooper, 1994), which assesses the four drinking motives originally implied by Cox and Klinger (1988). According to Cooper (1994), drinking motives can be classified along two dimensions: valence and source. Individuals may drink in an attempt to achieve a positive reward or to reduce/avoid a negative outcome. They may also drink in an attempt to change an internal state or to change their external environment. Crossing these two dimensions produces four separate motives for drinking: coping (internally motivated to reduce a negative state), enhancement (internally motivated to increase a positive state), conformity (externally motivated to reduce a negative state), and social (externally motivated to increase a positive state).

Alcohol outcome expectancies are another means of investigating why individuals consume alcohol. However, drinking motives differ from alcohol outcome expectancies in that expectancies refer to beliefs about positive effects (e.g., when I drink alcohol I am more accepted socially) and negative effects (e.g., when I drink alcohol I can't concentrate) of alcohol and motives refer to being motivated to use alcohol to achieve a

desired outcome or effect (Cooper, Kuntsche, Levitt, Barber, & Wolff, 2015).

Expectancies can be positive or negative, whereas motives are nearly always to obtain or achieve a positive, desired outcome (which can include reducing a negative outcome).

Even holding a positive belief about alcohol (e.g., that it will alleviate a negative mood) does not necessarily translate into actually being motivated to engage in alcohol consumption, as the individual may not place a high value on alleviating the negative mood, they have other means of alleviating the mood, or they may also hold negative beliefs about using alcohol that offset the negative affect relief expectancy (Cooper et al., 2015). Having a strong endorsement of any drinking motive is linked to increased alcohol consumption (Cooper et al., 2015) – with some motives being more strongly related than others to heavy or problematic consumption.

Social motives are the most commonly endorsed drinking motive, followed by enhancement, coping, and then conformity (Cooper et al., 2015). Social motives are highly correlated with the other positive reinforcement motive, enhancement motives (Grant, Stewart, O'Connor, Blackwell, & Conrod, 2007). Social motives tend to be associated with consuming alcohol at parties and in groups of mixed- and same-sex friends, and are negatively associated with consuming alcohol alone or at home. Coping motives, on the other hand, are associated with drinking at home and drinking alone, and are negatively associated with drinking at parties (Cooper, Russell, Skinner, & Windle, 1992; Cooper, 1994; Cooper et al., 2015). Consuming alcohol away from social gatherings means that coping-motivated drinkers are away from the typical social constraints of drinking that are present when with friends or at a party, i.e., there will not be anybody to indicate if they have been drinking too much or too fast. Perhaps not

surprisingly, coping motives tend to be associated with the poorest outcomes of all the drinking motives. Research indicates both an indirect relationship, through alcohol consumption levels, and a direct relationship, when alcohol consumption levels are controlled for, between coping motives and alcohol-related problems (Cooper et al., 1992; Cooper, 1994). Social motives, on the other hand, are not associated with alcohol-related problems, despite predicting alcohol consumption (Cooper et al., 1992; Cooper, 1994).

More recently, coping motives have been divided into drinking to cope with anxiety (CAM) and drinking to cope with depression (CDM; Grant, et al., 2007). This distinction has been validated, with CAM and CDM being associated with different patterns of alcohol use (Grant et al., 2007). One major difference between the two coping motives is that only CAM is directly related to alcohol-related problems, whereas CDM is only indirectly related through higher levels of alcohol consumption (Grant et al., 2007). Moreover, using a daily diary method, it has been shown that CAM specifically moderates the relationship between daily anxiety and drinking whereas CDM specifically moderates the relationship between daily depression and drinking (Grant, Stewart, & Mohr, 2009). This study showed that individuals with lower levels of CAM tended to inhibit their alcohol consumption when experiencing an anxious mood. Individuals with higher levels of CAM did not show this same inhibition of drinking when anxious (Grant et al., 2009), resulting in a higher daily anxious mood – alcohol consumption slope.

Recent research has also begun to explore a further subdivision of the coping motive by separately examining drinking to cope with social anxiety (CSAM; R. Cooper, Hildebrandt, & Gerlach, 2014; Stevens & Gerlach, 2009; Wagner, Stangier, Heidenreich,

& Schneider, 2004). Preliminary research findings indicated that CSAM are related to increased alcohol-related problems, and that higher social anxiety scores tend to predict higher endorsement of this motive (Cludius, Stevens, Bantin, Gerlach, & Hermann, 2013). Other research has indicated that undergraduates who are high in social anxiety tend to have higher endorsement of CSAM and higher levels of alcohol-related problems (Buckner & Heimberg, 2010).

Mood & Alcohol Use

Mood states can have a large impact on alcohol consumption, with both positive and negative mood states being found to serve as triggers for alcohol use (Birch, Stewart, Girling, & Berish, 2006b). In individuals with alcohol use disorders who are attempting to remain sober, relapses often occur in response to a negative event, although a significant minority also occur in response to a positive event (Marlatt & Gordon, 1980). Consuming alcohol in response to emotions may be learned in a number of different ways. It has been proposed that operant conditioning, classical conditioning, and observational learning theories can each help explain the link between mood and alcohol consumption (Birch et al., 2006b). Operant conditioning models include the Tension Reduction Hypothesis (Conger, 1956) and the Stress-Response Dampening Model (Sher & Levenson, 1982), both of which posit that alcohol reduces negative affect, namely tension, anxiety, or stress. This pairing of alcohol with negative mood reduction is easily learned over time (Birch et al., 2006b) as negative mood (e.g., anxiety, stress, sadness) can come to serve as a discriminant stimulus that signals to an individual that tension-reduction consequences will occur if alcohol were to be consumed in that situation. The Self-Medication Hypothesis (Khantzian, 1977) differs from these other two theories in

that it does not focus specifically on learning to drink for the anxiolytic effects of alcohol, but rather applies to learning to use alcohol to self-medicate for a wider range of negative affective states including both anxiety and depression.

Classical conditioning models state that alcohol is the unconditioned stimulus and the physiological effects of alcohol are the unconditioned response. After repeatedly pairing alcohol with a specific mood cue, this mood then becomes the conditioned stimulus that then prompts cognitive and physiological responses that lead to alcohol craving (the conditioned response; Cooney, Litt, Morse, Bauer, & Gaupp, 1997; Poulos, Hinson, & Siegel, 1981). However, these models cannot explain the initial pairing of alcohol with the specific mood states. Observational learning may be playing a key role in this aspect, whereby sociocultural factors (e.g., parental models, cultural norms) teach individuals when it is appropriate to use alcohol (Maisto, Carey, & Bradizza, 1999). For example, parents could impart to their offspring through modelling or verbal transmission that it is appropriate and acceptable to deal with negative emotional states through alcohol use.

Social Anxiety & Alcohol Use

Different negative moods appear to have differential impact on alcohol behaviours. Research has shown that university students with higher levels of depression consume more alcohol and engage in binge drinking more frequently than other students, whereas individuals with higher levels of anxiety, especially social anxiety, tend to consume less alcohol than other students (Morris, Stewart, & Ham, 2005). Despite anxious individuals consuming less alcohol than others, there is high comorbidity between anxiety disorders, including social anxiety disorder (SAD), and alcohol use

disorders (AUDs). It has been found that 28 - 48% of individuals with SAD meet criteria for lifetime prevalence of an AUD (Cludius et al., 2013; Grant et al., 2005), compared to 13% for the general population (Buckner, Schmidt, & Eggleston, 2006). Even among individuals with subclinical levels of social anxiety, there is still double the risk for an AUD when compared to individuals without anxiety (Cludius et al., 2013). This high comorbidity is concerning as research has shown much greater impairment when both disorders are present, compared to either disorder alone (Buckner & Heimberg, 2010). For example, individuals with SAD and an AUD, compared to those with no AUD, have more severe symptoms of SAD, more comorbidities, more physical health problems, and more interpersonal problems (i.e., are less likely to be married; Buckner, Timpano, Zvolensky, Sachs-Ericsson, & Schmidt, 2008b; Schneier et al., 2010; Schneier, Martin, Liebowitz, Gorman, & Fyer, 1989).

University students have high levels of alcohol consumption and alcohol-related problems (Bret et al., 2016; Ham et al., 2007; Hingson, 2010; Kuo et al., 2002), as noted earlier, as well high levels of SAD (Dell’Osso et al., 2014). Prevalence rates of SAD among undergraduates have been found to range from 3% (Blanco et al., 2008) to 16% (Tillfors & Furmark, 2007). Researchers found that not only were social anxiety symptoms quite common among university students, with nearly 40% of the sample being classified as medium or high scorers on a social anxiety self-report questionnaire, but also that there was marked functional impairment among these individuals as shown by avoidance and school difficulties (Dell’Osso et al., 2014). University is an environment that is high in social demands (e.g., forming new social relationships), and that is conducive to heavy alcohol consumption (Lewis et al., 2008). New students may

use alcohol as a means of forming new social relationships, and those with SAD may come to rely on alcohol not only to help form new social relationships, but also to reduce the anxiety associated with this task.

The current studies use a social avoidance measure to investigate social anxiety. Social avoidance is an aspect of social anxiety, but is linked with higher levels of impairment than social anxiety alone (Bogels et al., 2010). Individuals who are highly socially avoidant not only experience uncomfortable anxiety symptoms when in social situations, but they also avoid these situations when they can. In a hierarchical linear regression model which included anxiety, depression, harm avoidance, self-directedness, and alexithymia symptoms, social avoidance was significantly associated with depression, whereas social fear was not (Dalbudak et al., 2013). Given that high levels of social avoidance can result in social isolation, this link with depression is perhaps not surprising.

Drinking Context

Another important component in understanding the relationship between drinking motives, anxiety, and alcohol-related problems among university students is drinking context. The situational specificity hypothesis (Wall, Hinson, McKee, & Goldstein, 2001; Wall, McKee, & Hinson, 2000) states that contextual cues that are present in a given setting trigger cognitions about the effects of alcohol which in turn promote alcohol consumption in that context. This pairing of context and alcohol cognitions occurs through conditioning over time. Individuals who tend to consume alcohol in more negatively reinforcing contexts (e.g., when experiencing a high degree of negative emotionality or in personal/intimate contexts such as before sexual intercourse)

experience a higher degree of alcohol-related problems when compared to individuals who consume alcohol in more positive or convivial contexts (e.g., at a party; Cunningham, Sobell, Sobell, Gavin, & Annis, 1995). Context-specific heavy drinking has been investigated among individuals with social anxiety. While it has been found that social anxiety is not associated with heavy drinking in general, it is related to greater heavy drinking in certain contexts. Socially anxious individuals were found to be more likely than others to consume alcohol heavily in negative emotional and personal/intimate contexts, but not in social or convivial contexts (Terlecki & Buckner, 2015). This pattern may help explain why socially anxious individuals have higher levels of alcohol-related problems despite generally not drinking heavily. It may also be that socially anxious individuals are more likely than others to drink heavily when they are alone, possibly before (Keough, Battista, O'Connor, Sherry, & Stewart, 2016) or after attending a social event (Terlecki, Ecker, & Buckner, 2014). Social anxiety predicts solitary pre-drinking, alcohol consumption that occurs prior to a social event, which in turn was shown to predict higher levels of alcohol-related problems despite not predicting greater alcohol use. Social anxiety was negatively associated with social pre-drinking, which reduces overall risk of alcohol use and alcohol-related problems (Keough et al., 2016). Post-event processing (PEP) involves ruminating on the social event which triggers negative affect, which in turn may prompt self-medication with alcohol (Terlecki et al., 2014).

Aims of the Present Dissertation

Overall, prior theory and research has shown that (1) university students are at risk for problematic alcohol use; (2) drinking motives are one method of investigating antecedents, patterns, and consequences of alcohol use; (3) coping motives, including

CAM, CDM, and CSAM, tend to be the riskiest of the drinking motives in terms of associations with alcohol-related problems; (4) anxiety, specifically social anxiety, is strongly linked to alcohol-related problems, despite not being related to increased alcohol consumption levels overall; and (5) consuming alcohol in negatively reinforcing contexts is linked to alcohol-related problems and has been found to be common among university students with social anxiety. This dissertation aimed to expand upon prior theory and research by more definitively determining the role that coping drinking motives play in the alcohol consumption behavior and drinking outcomes of university student drinkers. This goal was accomplished by first examining the effect of inducing an anxious versus positive mood on the lab-based alcohol consumption levels of CAM (versus socially motivated) university student drinkers. Following this, two cross-sectional studies were conducted that examined the mediating roles of the negative reinforcement drinking motives and drinking context in explaining the relationship between social avoidance and alcohol-related problems. Finally, a longitudinal study extended prior research by examining the mediating role of all five drinking motives (CAM, CDM, conformity motives, social motives, and enhancement motives) in explaining the relationship between social avoidance and increasing alcohol-related problems over time.

The set of studies contained in my dissertation fill several important gaps in the literature on the role of coping drinking motives in the drinking behavior and alcohol-related problems of university students. I extended prior research by examining the impact of an anxious mood on CAM students, rather than a sad mood on generic coping motivated students (Birch et al., 2006b), on alcohol preference levels. My work also extended the extant literature on the mediating role of coping motives in the social

anxiety to alcohol-related problems relation by examining CAM, CDM, and CSAM separately, as most prior studies examined coping motives as a broad construct and no previous studies examined all three types of coping motives in a single model. This approach makes it possible to determine what negative emotion(s) socially anxious individuals are drinking to cope with specifically, allowing for future research to examine interventions aimed at particular negative affective state(s). For example, interventions for those with comorbid social anxiety and alcohol-related problems could be more effective and efficient if clinicians have information on whether these individuals are drinking to cope with anxiety, depression, and/or social anxiety. Interventions can then specifically target the negative affective state(s) identified and provide alternative coping strategies. My work also extended prior research by examining social avoidance as the index of social anxiety. Prior research has primarily focused on social fears and shyness (see Lewis et al., 2008; Stewart, Morris, Mellings, & Komar, 2006; Young, DiBello, Traylor, Zvolensky, & Neighbors, 2016), the latter of which is also linked to social anxiety but with *fewer* negative implications. My dissertation examined social avoidance as a more severe form of social anxiety, one linked to social isolation and depression, as it may have a different relationship with drinking motives, drinking context, and alcohol-related problems than either social anxiety or shyness. My dissertation also added to current literature by using a longitudinal design to examine the mediating role of coping motives in the relation of social avoidance and alcohol-related problems over time. Prior research has largely been limited by a cross-sectional model of mediation, with the select few longitudinal studies that have been conducted either not examining the mediating role of coping motives or focusing on a less severe presentation of social anxiety (i.e.,

shyness). Overall, my dissertation aimed to better understand how coping motives impact alcohol consumption and the role that they play in explaining the relationship between social avoidance and alcohol-related problems.

The four studies comprising my dissertation are presented in the coming chapters with Study 1 (the lab-based experiment) presented in Chapter 2, Studies 2a and 2b (the cross-sectional mediational studies) presented in Chapter 4, and Study 3 (the longitudinal mediational study) presented in Chapter 6. Chapters 3 and 5 provide short bridges linking the empirical studies, while Chapter 7 contains an integrative discussion of the four studies' findings and their theoretical and practical implications.

CHAPTER 2. STUDY 1: MOOD-INDUCED DRINKING IN COPING WITH ANXIETY MOTIVATED AND SOCIALLY MOTIVATED DRINKERS: A LAB-BASED EXPERIMENT²

Abstract

Alcohol misuse is a major problem on university campuses. One way to determine which students are at risk is to examine their drinking motives. Coping with anxiety motivated (CAM) drinkers have been found to have elevated alcohol-related problems, even after controlling for alcohol consumption levels. Socially motivated (SM) drinkers do not show elevated alcohol-related problems. The current study investigated the impact of mood induction (positive or anxious) and drinking motive (CAM or SM) on laboratory alcohol consumption levels in a sample of 81 undergraduate drinkers. SM drinkers consumed more alcohol when a positive mood was induced. Contrary to hypotheses, CAM drinkers did not consume more alcohol when an anxious mood was induced. However, they did not exhibit the normative pattern of reducing alcohol use when experiencing an anxious mood. CAM drinkers' increased alcohol-related problems may be related to this lack of inhibition of drinking when experiencing negative mood states.

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Introduction

Alcohol misuse is a major problem on college and university campuses, with nearly 60% of students enrolled at Canadian universities endorsing binge drinking in the past two weeks (Kwan, Faulkner, Arbour-Nicitopoulos, & Cairney, 2013). One way to identify which students are at risk for alcohol-related problems is to determine their motives for drinking (Birch, Stewart, & Zack, 2006a).

According to Cooper (1994), drinking motives can be classified along two dimensions: valence and source. Individuals may drink in an attempt to achieve a positive reward or to reduce/avoid a negative outcome. They may also drink in an attempt to change an internal state or to change their external environment. Crossing these two dimensions produces four separate motives for drinking: coping (internally motivated, to reduce a negative outcome), enhancement (internally motivated, to increase a positive outcome), conformity (externally motivated, to reduce a negative outcome), and social (externally motivated, to increase a positive outcome).

More recent research (e.g., Grant et al., 2007) has indicated the usefulness of subdividing the category of coping drinking motives into distinct coping with anxiety motives (CAM) and coping with depression motives (CDM). CAM and CDM have been found to be associated with different patterns of alcohol use, with CAM being directly related to alcohol-related problems, whereas CDM is only indirectly related to alcohol-related problems via increased levels of alcohol consumption (Grant et al., 2007). Cooper's (1994) original drinking motives model, as well as its more recent revision (Grant et al., 2007), are useful because there are different antecedents and consequences

of drinking behaviours for each of the various drinking motives.

All of the drinking motives are associated with alcohol-related problems with the exception of social motives (SM; Cooper, 1994; Cooper et al., 1992; Stewart, Hall, Wilkie, & Birch, 2002), which is the most commonly endorsed, normative drinking motive. Despite not being associated with alcohol-related problems, social motives are associated with greater frequency and quantity of alcohol consumption (Grant et al., 2007). As mentioned, CAM has been found to be directly related to alcohol-related problems meaning that even after usual alcohol consumption levels are controlled for, the motive itself is associated with increased alcohol-related problems (Grant et al., 2007).

The antecedents to drinking behaviours have also been found to vary by drinking motive. SM are associated with consuming alcohol in social situations and negatively predict consuming alcohol alone, whereas coping motives predict drinking alone or with a partner/date and do not predict consuming alcohol in other social situations (Cooper et al., 1992).

The impact of mood as an antecedent to alcohol consumption has also been investigated. It has been shown that the majority of relapse incidents among individuals with an AUD are precipitated by negative emotions; however, positive emotions that arise from a celebratory or social event are responsible for a significant proportion of relapses as well (Marlatt & Gordon, 1980). A number of theories have tried to explain alcohol consumption in response to negative mood states. For example, the tension reduction theory (Conger, 1956) and the stress-response dampening theory (Sher & Levenson, 1982) state that alcohol use is a functional behaviour aimed at reducing negative affect, namely anxiety. The self-medication model (Khantzian, 1997) is different

in that it posits that alcohol can be used to reduce any negative affect, rather than just anxiety, or that alcohol can be used to increase positive internal states if those are absent. It is possible that certain individuals may be more sensitive to specific effects of alcohol, namely that enhancement motivated (EM) drinkers are more sensitive to the euphoric effects of alcohol, whereas coping motivated (CM) drinkers are more sensitive to the tension reducing effects of alcohol (Birch et al., 2006b). Alternatively, it may be that EM drinkers and CM drinkers are not differentially sensitive to the effects of alcohol but rather that EM drinkers value the stimulating effects of alcohol more, whereas CM drinkers value the relaxation effects of alcohol more (Wilkie & Stewart, 2005). Drinking motives may be an important factor to investigate when examining the impact of mood on drinking behaviour.

A laboratory study that investigated how musically-induced moods (either positive or negative) impacted alcohol expectancies amongst individuals who were classified as either coping motivated or enhancement motivated found that only coping motivated drinkers in the negative mood condition reported increased relief expectancies (Birch et al., 2004). Moreover, only enhancement motivated drinkers in the positive mood condition reported increased reward expectancies, showing that specific mood states differentially impact individuals with different drinking motives, at least in terms of cognitive outcomes relevant to drinking behaviour (Birch et al., 2004).

Past research has also examined the effects of mood induction on drinking behaviour among coping motivated and enhancement motivated individuals. Coping motivated drinkers have been shown to exhibit a higher alcohol preference when a negative mood is induced. However, this effect was only observed in women (Birch et

al., 2006b). Limitations of this research were that the negative mood induced was specifically a sad mood (Birch et al., 2006b), and the study did not differentiate between CAM and CDM drinkers. It remains to be determined if similar findings might be obtained for CAM drinkers following an anxious mood induction. This same study also found that a positive mood induction increased alcohol consumption in enhancement motivated (EM; Birch et al., 2006b) male drinkers, showing that there may be sex differences in how drinking motives and mood interact to impact drinking behaviour.

The current study was designed to investigate if CAM drinkers display higher alcohol preferences and alcohol consumption when an anxious mood, compared to a positive mood, is induced. I expected to find that this effect would be especially true for female CAM drinkers, as past research has shown that a negative mood induction led to a higher alcohol preference only among coping motivated women (Birch et al., 2006b). SM drinkers were selected as a comparison group in the current study, since SM are associated with greater quantity and frequency of alcohol use, but not with alcohol-related problems (Cooper et al., 1992). Very little research has been conducted on the mood-related antecedents of drinking in SM drinkers. As SM are an externally driven motive (Cooper, 1994), mood theoretically should not impact drinking behaviour of SM drinkers to the same extent as for individuals who drink primarily for an internal motive like CAM.

Method

Participants

Participants were university students recruited from an online psychology database at the university where this study took place, as well as from the broader

community through posters and online advertisements. Participants were selected to participate based on their screening scores on the Modified Drinking Motives Questionnaire-Revised (M DMQ-R; Grant et al., 2007). Those with high CAM scores and those with high SM scores were eligible to participate. In order to be eligible to participate, an individual had to score at least one standard deviation above the mean, which was compiled based on 603 undergraduate students' data (Grant et al., 2007), on either the CAM or SM subscale, as well as showing their highest z-score elevation on this scale relative to the other four subscales. This selection method has been successfully used as eligibility criteria in previous studies (Birch et al., 2006b). In addition to having met the Modified DMQ-R eligibility requirements, participants had to be 19-25 years old and to have consumed at least one alcoholic beverage in the past month. Participants were excluded from participating if they self-identified as abstaining from alcohol use, if there was evidence of problematic alcohol use (i.e., current or past treatment for alcohol use disorders, past diagnosis of alcohol dependence), if they were currently using any prescription medications for which alcohol consumption is contraindicated, if female participants were currently pregnant, if they had any medical conditions for which alcohol consumption is contraindicated, or if they had been previously hospitalized for psychiatric treatment.

Eighty-one participants were recruited for this study; thirty-seven met eligibility for inclusion in the CAM group (18 males and 19 females) and forty-four met eligibility for inclusion in the SM group (18 males and 26 females). Participants were 20.6 years old on average ($SD = 1.73$) and 82.7% identified as Caucasian. The remainder of participants identified as Black (3.7%), Canadian Aboriginal (1.2%), Asian (6.2%), and other (6.2%).

This latter category included mixed race, Pacific Islander, Arab, and Indian. Participants ranged from being in first year of university ($n = 14$) to fifth year of university ($n = 5$), with the majority of participants being in their second ($n = 24$) and third ($n = 24$) year of university. The remainder ($n = 14$) were in their fourth year.

Materials

Demographic information was collected using an author-compiled measure that assessed variables including age, year of university, sex, and ethnicity (see Appendix A).

Alcohol-related problems were measured with the Rutgers Alcohol Problem Index (RAPI; White & Labouvie, 1989). This 23-item questionnaire assesses severity of problems related to alcohol consumption (e.g., “Not able to do your homework or study for a test,” “Went to work or school high or drunk”), and is specifically designed to assess for the kinds of alcohol-related problems present for adolescents and emerging adults. Responses are scored on a 0 – 4 scale ranging from “never” to “more than 10 times.” Cronbach’s alpha reliabilities for the RAPI were high (.83) in the sample. Scores on this measure were within 1 SD of prior studies with a university population (e.g., Stewart et al., 2002).

Drinking motives were measured with the Modified Drinking Motives Questionnaire- Revised (M DMQ-R; Grant et al., 2007). This is a 28-item self-report questionnaire that produces scores on five subscales representing motives for alcohol consumption, including CAM and SM scales. Subscale scores are calculated as the mean of the comprised items. The current test-day Cronbach’s alpha of the CAM subscale and SM subscale were .65 (5 items) and .69 (4 items), respectively. Loewenthal (1996) argues that a cut-off of .60 should be used to assess for adequate reliability with short scales, as

were used in this study.

Self-report items were used to assess mood pre- and post-mood induction. To measure positive mood (*cheerful, happy, glad, and pleased*) and anxious mood (*nervous, anxious, and tense*), participants were asked to rate how much they were currently feeling each emotion by rating on a scale of 0 (not at all) to 10 (very). The positive and anxious affect scores were the sum of each of the items that made up each scale. The Cronbach's alpha values ranged from .89 to .95 for the positive mood items to .89 to .92 for the anxious mood items in the present study, indicating good to excellent internal consistency.

The music used for the positive mood induction was identical to that used by Birch et al. (2004) and Grant and Stewart (2007). It was originally compiled by Pignatiello, Camp, and Rasar (1986) and was later adapted by Mongrain and Trambakolous (2007). The music used for the anxious mood induction was identical to that used by Grant and Stewart (2007) and has been found to effectively induce anxiety in other mood induction studies (e.g., Albersnagel, 1988; Shapiro & Lim, 1989).

Procedure

If a participant was eligible and wished to take part, then an experimental session was scheduled. The participant was asked to abstain from alcohol and drugs for twelve hours before the scheduled appointment. Recent abstinence from alcohol was checked with a breathalyzer when participants arrived. Participants were also asked to refrain from eating for three hours prior to the scheduled appointment to ensure relatively similar metabolism of alcohol and similar hunger levels across participants during the study. Participants completed the experiment in a laboratory room that was designed to mimic a

bar-environment. This environment included visible wine bottles and glassware on a bar top, various advertisements and posters for alcohol, and two Video Lottery Terminals (VLTs) that are found in many bars in the region. Participants primarily completed the experiment alone, with the experimenter only entering the room when necessary (i.e., when a certain portion of the experiment had been completed). The first part of the experiment involved completing questionnaires on the computer. These included a basic demographics measure, self-report items assessing baseline mood, the RAPI (White & Labouvie, 1989), and a test-day Modified DMQ-R (Grant et al., 2007). Participants were then randomly assigned and exposed to a musical mood induction procedure (MMIP). The MMIP was composed of 10-minute compilations of non-lyrical classical and popular music pieces that have been found to reliably induce target moods in the past (Albersnagel, 1988; Grant et al., 2007; Martin, 1990). Self-report items regarding mood were then administered for a second time as a manipulation check to ensure that the target mood had been induced by the MMIPs. Following this, a 20-minute unobtrusive mock taste-rating task (Higgins & Marlatt, 1973) was used to measure drinking levels in the lab. This task has previously been used as a successful lab-based assessment of drinking behaviour (e.g., Birch et al., 2006b). Participants were asked to rank the taste qualities of four beverages, of which two contained alcohol. They were served 400 mL each of two alcoholic mixed drinks (rum and cola; vodka and orange juice) and two non-alcoholic drinks (cola; orange juice), and were asked to rate each drink on a number of adjectives that appeared on a computer screen. They were told that they could drink as much of each beverage as they liked to make their ratings. The dependent measure was an alcohol preference ratio, which is the proportion of the total volume of beverages

consumed that contain alcohol.³ Following the task, a breathalyzer test was performed to ensure that participants had a blood alcohol concentration (BAC) below 0.04%. Those who were above 0.04% were required to remain in the lab until their BAC had fallen below this level in order to ensure participant safety on leaving the lab. Participants were also instructed to have a ride home from the study pre-arranged. Those who were unable to arrange a safe ride home were provided a taxi ride home. Participants were debriefed regarding the true nature of the taste-rating task, the necessity of the deception around the task in order to obtain an accurate assessment of their level of drinking, and the study hypotheses, prior to their departure from the lab. See Appendix B for detailed protocol⁴.

Results

Demographics. A series of 2 x 2 (mood condition x motive group) ANOVAs showed that there were no significant main or interactive effects on any of the demographic variables (age, year of university, ethnicity [Caucasian versus other], gender, grades, or family salary), indicating that none needed to be controlled in the hypothesis tests.

Stability of Drinking Motives. Drinking motives were stable from screening-day to test-day. Pearson product-moment bivariate correlations showed that screening day Z-scores and test-day Z-scores were significantly correlated for both SM and CAM: $r = .24$, $p < .05$ and $r = .56$, $p < .01$, respectively, particularly for CAM (an internal motive).

³ Note: total alcohol consumed was also investigated as a dependent variable. The findings did not differ between the two sets of results.

⁴ Study 1 was the only study in this dissertation that required such a detailed protocol and is the only protocol included in the appendices.

Mood Manipulation Check. A set of two 2 (mood condition) x 2 (motive group) x 2 (gender) between-subjects ANOVAs on baseline positive and anxious affect scores, respectively, revealed that there were no significant motive group, gender, or mood condition effects prior to mood induction.

To verify that the MMIPs were effective, a set of two 2 (mood condition) x 2 (motive group) x 2 (gender) ANCOVAs were conducted on positive and anxious affect scores collected immediately after the MMIP, with baseline positive and anxious affect scores co-varied out, respectively. For anxiety ratings, there was a significant main effect of mood condition, with baseline-adjusted anxious affect being higher in the anxious mood condition than in the positive mood condition, $F(1, 72) = 7.96, p = .006$ (see Table 1.1 for means). The interaction between mood condition and gender was marginally significant, $p < .06$. As I was specifically interested in gender differences in the anxious mood condition, this marginal interaction was broken down to examine the efficacy of the mood manipulation in each gender separately. A separate 2 (mood condition) x 2 (motive group) ANCOVA in each gender revealed a main effect of mood condition on anxious mood for the females, $F(1, 40) = 10.28, p = .003$ (anxious mood condition $M = 10.46, SD = 7.99$ vs. positive mood condition $M = 4.00, SD = 5.92$) but not for the males, $F(1, 31) = .39, p = .54$ (anxious mood condition $M = 7.13, SD = 7.70$ vs. positive mood condition $M = 3.65, SD = 4.65$). This indicates that the anxiety-induction was successful for the female but not for the male participants.

For positive mood, there was a significant main effect of mood condition, with baseline-adjusted positive mood scores being higher in the positive mood condition than in the anxious mood condition, $F(1, 72) = 7.55, p = .008$ (see Table 1.1 for means). There

were no other significant interaction or main effects. Thus, the positive MMIP was effective in inducing the desired positive mood.

Hypothesis Tests. A preliminary 2 (gender) x 2 (motive group) x 2 (mood condition) between-subjects ANOVA on alcohol preference ratio scores revealed a main effect of gender, $F(1, 73) = 7.12, p = .009$, with males ($M = 0.60, SD = .13$) showing a higher alcohol preference than females ($M = .50, SD = .16$) regardless of mood condition or drinking motive. There were no other significant effects.

Given my a priori hypotheses, to test the first two hypotheses, the 2 x 2 (motive group x mood condition) table of means was broken down into a set of planned comparisons (see Stewart et al., 2002). Planned comparisons were chosen to analyze the hypothesized comparisons first, using conventional alpha levels, as recommended by Tabachnick and Fidell (2001). I used t-tests to examine these planned comparisons. The hypothesis that SM drinkers would not show a differential alcohol preference based on mood condition was examined using an independent samples t-test to compare alcohol preference ratio scores in SM drinkers in the positive vs. anxious mood conditions. Unexpectedly, SM drinkers consumed a significantly higher proportion of alcohol in the positive mood condition compared to the anxious mood condition ($t(42) = -2.18, p = .04$; see Figure 1.1). The hypothesis that CAM drinkers would show a higher preference for alcohol in the anxious mood condition relative to the positive mood condition was examined using an independent samples t-test to compare alcohol preference ratio scores in the CAM drinkers in the positive vs. anxious mood conditions. Results did not support this hypothesis given that there was no significant overall effect of mood condition, $t(35) = -.21, p = .84$ (see Figure 1.1).

Given the finding that the anxious mood induction was only effective for the women and the third hypothesis that only the female, but not the male, CAM drinkers would show a greater preference for alcohol in the anxious relative to the positive mood condition, a set of independent samples t-tests was used to compare alcohol preference ratios in the positive and anxious mood conditions, separately for the female and male CAM drinkers. Neither male ($t(16) = .10, p = .93$) nor female ($t(17) = -.38, p = .71$) CAM drinkers showed differential alcohol preference based on mood condition (see Table 1.2). Thus, when examined by gender, results for CAM drinkers failed to support the hypothesis that CAM women would show a greater preference for alcohol when in an anxious as compared to a positive mood state.

Discussion

The results from this study provide novel information on how mood impacts drinking among emerging adults who drink for social motives. As social motives are an externally driven motive (Cooper, 1994), it was not clear that internal factors such as mood would impact actual drinking behaviours. The finding that SM drinkers showed a greater alcohol preference when a positive mood was induced relative to an anxious mood may be related to the positive environment (e.g., parties, with friends) in which SM drinkers typically consume alcohol (Cooper et al., 1992). Thus, positive mood may be a common factor when they are drinking, and inducing this mood appears to lead to increased alcohol consumption among SM drinkers. Classical conditioning has been used to explain alcohol consumption in response to specific moods, and may be a potential explanation for why SM drinkers consumed relatively more alcohol when a positive mood was induced. This theory would suggest that alcohol and positive mood are

frequently paired for SM drinkers, due to the positive environments in which many SM drinkers consume alcohol. Over time, the positive mood becomes a conditioned cue to consume alcohol amongst SM drinkers (Cooney et al., 1997).

Another potential explanation for the positive mood-SM relationship is the strong positive correlation between SM and enhancement motives. Prior research has indicated that the strongest correlation amongst all drinking motives is between these two motives (e.g., Grant et al., 2007), and some prior studies have even combined the two motives into a social-enhancement composite motive (i.e., a positive reinforcement motive) due to this strong relationship (e.g., Armeli, Todd, Conner, & Tennen, 2008). It may be that the high overlap between SM and enhancement motives is responsible for the pattern of results observed in the present study since theoretically enhancement motivated drinkers should drink more in response to positive mood as has been shown in previous lab-based work (Birch et al., 2006b). However, my SM participants were selected to have their primary motive be SM as opposed to enhancement motives. The degree of overlap of SM and EM in the present study was only mild,⁵ making this explanation less likely.

The current study did not find evidence for my hypothesis that CAM drinkers would show a greater preference for alcohol when an anxious mood, compared to a positive mood, was induced. In a daily diary study, Mohr and colleagues (2005) found that negative mood-drinking relationships were stronger amongst those with high levels of coping motives, but this was only found for drinking at home. Perhaps the laboratory

⁵ The correlation between social and enhancement motives scores was: $r = .29, p < .01$.

setting in which the current study took place, which was designed to mimic a bar-environment rather than a home-environment, was at least partially responsible for the lack of an anxious mood-induced increase in drinking for CAM drinkers.

Another potential interpretation of these findings is that CAM drinkers did not decrease their alcohol consumption when an anxious mood was induced. A daily diary study that investigated the relationship between daily mood and daily alcohol consumption, and moderation by drinking motives, found that CAM drinkers had higher daily anxious mood – alcohol consumption slopes (Grant et al., 2009). However, the results showed that individuals with lower levels of CAM were more likely to inhibit their drinking when experiencing anxious mood states, whereas those with higher levels of CAM did not show such inhibition of their drinking. The current study provides an experimental replication of this past daily diary research in that CAM drinkers did not increase their alcohol consumption in response to an anxious mood induction, but instead failed to show the normative decrease in alcohol consumption when an anxious mood was induced.

The hypothesis that there would be gender differences among CAM drinkers was based on prior research (Birch et al., 2006b) that showed that inducing a sad mood amongst coping motivated women led to an increase in alcohol consumption. However, the current study differed in that Birch and colleagues (2006b) examined coping motives broadly, which includes CDM items, whereas the current study focused specifically on CAM. I also used an anxious mood induction rather than a sad mood induction in the current study. Related to this, it may be that the outcome of the current study (drinking behaviour) is less relevant for CAM drinkers when compared to SM or CDM drinkers.

CDM is linked to alcohol-related problems through heavier alcohol consumption, whereas CAM is linked to alcohol-related problems independent of alcohol consumption levels. This may be why Birch and colleagues (2006b) found significant mood effects on drinking behaviour and the current study did not. Perhaps having a measure of alcohol-related problems (rather than alcohol consumption levels) as the outcome would have been a more relevant measure for CAM drinkers.

Limitations

The current study sample was composed solely of university students, which may make these results difficult to generalize to other populations such as older individuals or clinical samples of individuals with an alcohol use disorder. Another limitation of the current study was that the anxious mood induction was not successful for male participants. It is possible that male participants were less inclined to report feelings of anxiety compared to female participants. A recent study found that females' self-report anxiety scores were significantly higher than males, but with no difference found in observer-rated scales, perhaps indicating that males actually experience similar levels of anxiety to females, but are less likely to admit to these negative emotions due to gender role expectations of stoicism in men (Pesce et al., 2016). Or perhaps women are truly more responsive to an anxious musical mood induction than are men. Prior research has found that more women are susceptible to the influence of MMIPs (Albersnagel, 1988; Rogowski, 1991), which fits with the current findings. Nonetheless, the failure of the anxious mood induction among male participants in the present study compromises my examination of gender differences in the impact of anxious mood in triggering alcohol consumption among CAM drinkers.

An important consideration is that the current study did not include a neutral mood condition. Thus, it is unclear whether positive mood led to increased drinking in SM drinkers or if the anxious mood led to decreased drinking in SM drinkers. Prior research has shown that SM drinkers tend to suppress their alcohol consumption when experiencing a negative emotion (Grant et al., 2009), so the results of the current study may be reflecting this, rather than showing an impact of positive mood in increasing drinking behaviours among SM drinkers.

Future Research

While the current study did not find that CAM drinkers consumed more alcohol when an anxious mood was induced, this may be a result of inducing the incorrect type of anxiety. Individuals may drink to cope with a wide range of anxieties such as panic, social, or generalized anxiety. The drinking motives measure used does not distinguish participants based on the type of anxiety that they typically drink to cope with, nor was the music intended to induce any one specific form of anxiety. If some participants typically drink to cope with social anxiety, for example, then it is possible that the lab environment, in which they are sitting alone in a room, was not relevant for their usual coping drinking. Future research should examine the role of drinking to cope with anxiety to determine if it impacts drinking behaviours and outcomes in individuals with different types of anxiety, such as social anxiety or panic anxiety.

Future research could also directly compare SM and enhancement motivated drinkers on the situational antecedents to alcohol use. It may be that a mood manipulation (i.e., inducing a positive mood) would have a stronger effect on EM drinkers, whereas a situational manipulation (i.e., being in a social context) would have a stronger effect on

SM drinkers. Due to the high overlap between these two motives, it would be necessary for such a future study to be adequately powered.

Implications

The results of the current study indicate that alcohol prevention and treatment programs for individuals who are primarily SM drinkers may want to focus on the impact of positive mood. Theory suggests that mood should not impact the drinking behaviour of SM drinkers, as SM is an external motive (Cooper, 1994), yet the results may indicate otherwise. Individuals who are primarily SM drinkers but who may be experiencing difficulties with their drinking should be made aware of the impact of positive mood on their alcohol consumption. Perhaps this knowledge will allow them to react differently to a positive mood, rather than by consuming alcohol. It would also be important to teach SM drinkers to find alternative rewarding activities to drinking when they are in a positive mood state such as when in a convivial social setting. Harm reduction techniques (e.g., interspersing alcoholic drinks with non-alcoholic alternatives) for when they are in a positive mood state with alcohol available may also be helpful.

As CAM drinkers did not show the normative pattern of decreasing their alcohol consumption when feeling anxious, different intervention strategies may be warranted. In particular, it may be helpful to train CAM drinkers to moderate their drinking when experiencing anxious mood states.

Table 1.1. Mood Group Differences in Covariate (Baseline) Adjusted Mean Positive and Anxious Affect Scores Following MMIP

Mood Condition Group	Positive affect scores		Anxious affect scores	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Positive	27.14	7.54	3.83	5.28
Anxious	22.52	7.36	9.13	7.95

Note. Positive affect scores are significantly different between positive versus anxious mood condition, $p < .01$. Anxious affect scores are significantly different between positive versus anxious mood conditions, $p < .001$.

Table 1.2. Alcohol Preference Ratios (proportion of the total volume of beverages consumed that contain alcohol) amongst CAM Drinkers as a Function of Mood Condition and Gender.

Gender	Positive Mood		Anxious Mood		<i>Sig.</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	
Male	0.58	0.12	0.59	0.19	0.93
Female	0.50	0.19	0.47	0.21	0.71

Note. Comparisons were made within gender and across mood condition. Neither effect was significant.

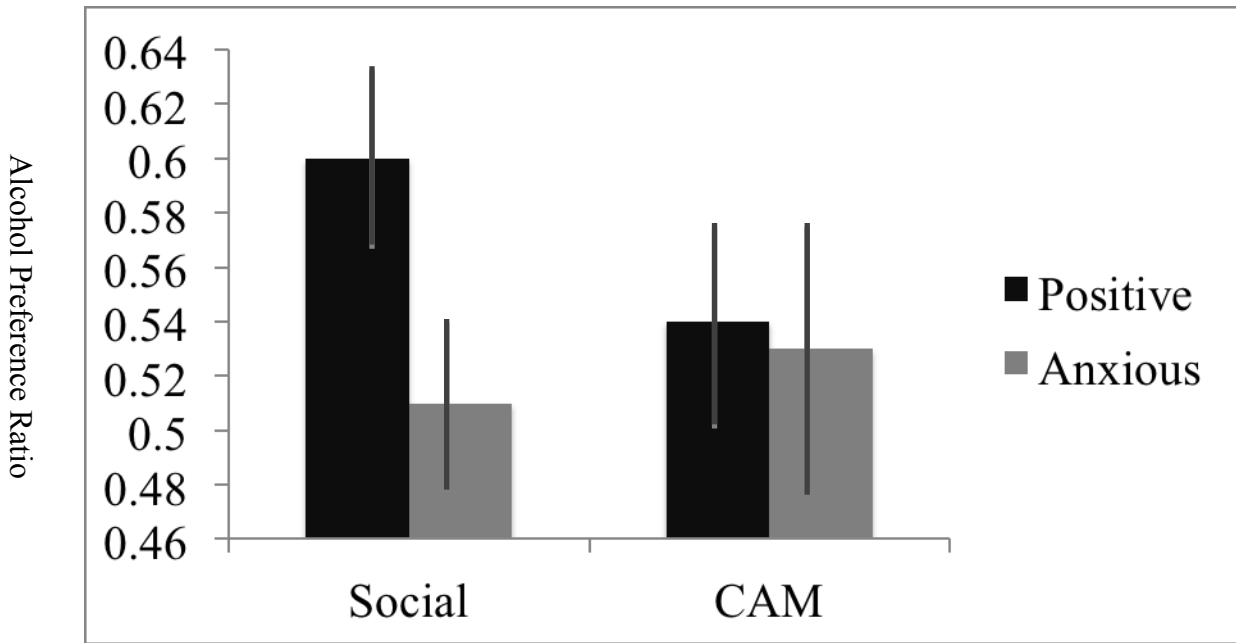


Figure 1.1. Alcohol preference ratios (proportion of the total volume of beverages consumed that contain alcohol) as a function of drinking motive group and mood condition.

Note. SM drinkers had a significantly higher alcohol preference in the positive mood condition than in the anxious mood condition, $p = .04$. Standard error bars are shown.

CHAPTER 3. PROLOGUE TO STUDY 2A AND STUDY 2B

Results from Study 1 indicated that contrary to hypotheses, CAM drinkers did not consume more alcohol when an anxious mood, compared to a positive mood was induced. There are a number of potential explanations for these findings, as highlighted in the previous chapter. Of those potential explanations, I sought to further understand the possibility that while Study 1 participants did experience increased anxiety levels as a result of the anxious MMIP, perhaps I had induced the incorrect form of anxiety for triggering alcohol consumption. While the experimental lab in Study 1 was designed to mimic a bar environment, the participants were in the room alone which is a significant difference from a typical social drinking environment. The lack of social interaction, and therefore lack of social anxiety, may have been a partial contributor to explaining why CAM drinkers did not consume more alcohol when an anxious mood state was induced, as it may have been the incorrect form of anxiety (generalized anxiety as opposed to social anxiety). Prior research has also indicated that context is an important predictor of drinking behaviours (Buckner et al., 2006; Ham, Zamboanga, Bacon, & Garcia, 2009; Terlecki & Buckner, 2015; Terlecki et al., 2014) and so the experimental context may have impacted the drinking behaviours of the participants as well.

Among university students, social anxiety is relatively common (Purdon, Antony, Monteiro, & Swinson, 2001). There are a number of novel life experiences and often the requirement to make new friendships occurs during the transition into university; these changes may be a potential explanation for why many students experience social anxiety in some capacity (Ham et al., 2009). Prior research has shown that more severe levels of social anxiety are associated with a wide range of impairments such as reduction in

quality of life in social and occupational domains (Lochner et al., 2003; Quilty, Van Ameringen, Mancini, Oakman, & Farvolden, 2003), in addition to comorbidity with other anxiety disorders, mood disorders, and substance use disorders (Fehm & Wittchen, 2004), including alcohol use disorders (Grant et al., 2005). Social avoidance is a more severe presentation of social anxiety that is linked with increased isolation (Bogels et al., 2010) and depression (Dalbudak et al., 2013). Social avoidance was used to assess for social anxiety in the following studies due to the more severe presentation.

Socially anxious students experience elevated levels of alcohol-related problems relative to other students despite not consuming more alcohol overall, and so the set of studies presented in the next chapter were designed to investigate the mechanisms that drive this relationship between social anxiety and alcohol-related problems. Building on and extending prior research, Study 2a and Study 2b were cross-sectional investigations designed to investigate the mediational role of negative reinforcement drinking motives including conformity motives and the different coping motives (CAM and CDM in Study 2a and CAM, CDM, and CSAM in Study 2b) as well as drinking context (Study 2b) in explaining the relationship between social avoidance and alcohol-related problems.

CHAPTER 4. STUDY 2A AND STUDY 2B: DO DRINKING MOTIVES AND DRINKING CONTEXTS MEDIATE THE RELATIONSHIP BETWEEN SOCIAL ANXIETY AND ALCOHOL PROBLEMS? EVIDENCE FROM TWO STUDIES OF UNDERGRADUATE DRINKERS⁶

Abstract

Social anxiety disorder (SAD) and alcohol-use disorders (AUDs) are commonly comorbid, and university undergraduates may be especially susceptible to misusing alcohol when dealing with social anxiety and associated avoidance. Research suggests drinking motives, particularly coping and conformity motives, mediate the relation between social anxiety and alcohol-related problems, as do drinking contexts, particularly personal/intimate and negative emotional contexts. Study 2a extended prior research by examining conformity motives, coping with anxiety motives (CAM), and coping with depression motives (CDM) as distinct mediators in a cross-sectional study of 263 undergraduate drinkers. Only CDM mediated the relation between social avoidance and alcohol-related problems. Study 2b extended prior research by including drinking contexts and motives as mediators in a single model and including a coping with social anxiety drinking motive (CSAM) mediator in a cross-sectional study of 189 undergraduate drinkers. CDM and CSAM independently mediated the relationship between social avoidance and alcohol-related problems. CSAM also predicted drinking in personal/intimate contexts, which then led to alcohol-related problems in a chained

⁶ This manuscript is adapted from ‘Collins, J. L., Sherry, S. B., Thompson, K., & Stewart, S. H. (2017). *Do drinking motives and drinking contexts mediate the relationship between social anxiety and alcohol problems? Evidence from two studies of undergraduate drinkers*’ which is currently under review at a peer-reviewed journal. As first author of this manuscript, I played a lead role in designing the study, successfully seeking ethics approval, organizing participant recruitment, and collecting data. In addition, I conducted the data analyses, wrote the manuscript, and revised the manuscript in accordance with suggestions from my co-authors.

mediation fashion. Undergraduates with high levels of social avoidance drink for both CDM and CSAM, which in turn predict heavy drinking in risky contexts; however, drinking motives, rather than risky contexts, largely mediated the relation of social avoidance to alcohol-related problems.

Introduction

Social anxiety disorder (SAD) and alcohol use disorders (AUDs) are commonly comorbid conditions. Nearly 50% of individuals with a lifetime diagnosis of SAD will also meet criteria for an AUD at some point in their life (Grant et al., 2005). Several theories explain this strong relationship, including: (a) the tension-reduction theory (Conger, 1956), (b) the stress response dampening model (Sher & Levenson, 1982), and (c) the self-medication hypothesis (Khantzian, 1997). These theories hold in common the notion alcohol serves as a mechanism by which those with social anxiety can acutely reduce their feelings of anxiety, ultimately placing them at risk for excessive drinking and AUD development (see Morris et al., 2005). The self-medication hypothesis (Khantzian, 1997) differs from the other two in that it does not focus specifically on the anxiolytic effects of alcohol, but rather can be applied to alcohol use to self-medicate for a wider range of negative affective states including both anxiety and depression.

The relationship between social anxiety and alcohol-related problems may be especially important in undergraduates, as university is an environment high in social demands (e.g., forming new social relationships), and conducive to heavy alcohol consumption (Lewis et al., 2008). New students may use alcohol as a means of forming new social relationships, and those with social anxiety may come to rely on alcohol not only to help form new social relationships, but also to reduce any anxiety associated with this task.

Studies investigating the social anxiety—alcohol problem relationship counterintuitively suggest social anxiety is associated with *lower* overall levels of alcohol

consumption (Buckner et al., 2006; Ham et al., 2007), yet *higher* levels of alcohol-related problems (Lewis et al., 2008; Stewart et al., 2006) and AUDs (R. Cooper et al., 2014). This pattern suggests the presence of a variable other than heavy alcohol use that must be driving the relationship between SAD and AUD. Drinking motives have been hypothesized as one such variable, with several studies investigating this possibility (Buckner et al., 2006; R. Cooper et al., 2014; Ham et al., 2007; Lewis et al., 2008; Stewart et al., 2006).

Drinking motives are a person's reasons for consuming alcohol. M. L. Cooper (1994) asserts people drink to achieve a variety of desired outcomes that fall along two dimensions: valence and source. Valence refers to the type of reward desired by using alcohol (i.e., positive or negative reinforcement), and source refers to the source of the desired reward (i.e., internal or external). Crossing these two dimensions produces four primary drinking motives: (a) coping motives – internally motivated, to reduce a negative state, i.e., drinking to reduce anxiety or depression; (b) conformity motives – externally motivated, to reduce a negative state, i.e., drinking to reduce social censure; (c) social motives – externally motivated, to increase a positive state, i.e., drinking to increase social affiliation, and (d) enhancement motives – internally motivated, to increase a positive state, i.e., drinking to increase pleasurable emotions (M. L. Cooper, 1994).

Coping motives have been further subdivided into drinking to cope with anxiety (CAM) and drinking to cope with depression (CDM; Grant, et al., 2007). This distinction is validated, with CAM and CDM being associated with different patterns of alcohol outcomes (Grant et al., 2007). One major difference between the two coping motives is that only CAM is directly related to alcohol-related problems, whereas CDM is indirectly

related to problems through higher levels of alcohol consumption (Grant et al., 2007). Moreover, using a daily diary method, CAM specifically moderated the relationship between daily anxiety and drinking whereas CDM specifically moderated the relationship between daily depression and drinking (Grant et al., 2009).

Several studies have examined the mediating role of drinking motives in explaining the link of social anxiety to alcohol-related problems in undergraduates. In Stewart and colleagues (2006), 157 undergraduate drinkers completed questionnaires assessing social anxiety, drinking motives, and drinking behaviour and outcomes. Social anxiety was negatively associated with frequency of drinking occasions, but positively related to alcohol-related problems. This latter relationship was mediated by both coping and conformity drinking motives (Stewart et al., 2006). These findings were replicated in another study of 316 undergraduates that found students higher in social anxiety consumed less alcohol but experienced more alcohol-related problems. This latter relationship was also mediated by both coping and conformity motives (Lewis et al., 2008).

Another study by Ham and colleagues (2009) used a sample of 817 undergraduates to investigate the mediational role of drinking motives and found coping motives partially mediated the relationships between social anxiety and both alcohol-related problems and alcohol dependence symptoms. Conformity motives were not found to be a mediator in this study. Villarosa, Madson, Zeigler-Hill, Noble, and Mohn (2014) examined the mediating role of drinking motives in the relation between social anxiety and alcohol-related problems in 532 undergraduates. Conformity motives partially mediated the relation between social anxiety and alcohol-related problems, but coping

motives were not a significant mediator. Buckner and Shah (2015) broke coping motives into CAM and CDM (see Grant et al., 2007) in a study with 461 undergraduate drinkers. They found CAM specifically mediated the relationship between social anxiety and alcohol-related problems among women whereas conformity motives specifically mediated the relation among the men. CDM were not found to be a significant mediator in either sex. Overall, evidence suggests social anxiety is strongly associated with alcohol-related problems in undergraduates. Moreover, this relationship appears to be mediated by drinking motives, particularly conformity motives and coping motives.

The present set of studies used a social avoidance measure as a clinically-useful social anxiety index as social avoidance is linked to high levels of impairment: socially avoidant people not only experience distressing levels of social anxiety, but due to this distress, they also avoid situations involving social interactions (Bogels et al., 2010). This contrasts with people who have only elevated levels of social fear, as these individuals are anxious when faced with social situations but they are more willing to endure them. A longitudinal study of youth aged 9 to 21 years tested the developmental pathways of social avoidance over time (Miers, Blote, Heyne, & Westenberg, 2014). These researchers found two trajectories of either high social avoidance or low social avoidance that were nearly indistinguishable at age 9, but steadily became more distinct over time. Social anxiety was found to predict belonging to the high social avoidance trajectory group. Depression was also a significant predictor of this trajectory, though to a lesser extent (Miers et al., 2014). My research extends prior research examining the social anxiety—alcohol-related problems relationship to the important social anxiety feature of social avoidance.

Study 2a: Investigation of the Role of Coping Motives in the Relationship Between Social Avoidance and Alcohol Problems

Evidence shows the link between social anxiety and alcohol-related problems is relatively robust, and drinking motives, particularly negative reinforcement motives, appear to play a mediating role in this relationship. Study 2a aimed to replicate and extend the extant research by investigating the potential mediating role of drinking motives in explaining the hypothesized relation of social *avoidance* to alcohol-related problems in a cross-sectional design. Study 2a extended prior research by investigating the role that *both* coping motives identified by Grant et al. (2007; i.e., CAM and CDM) have in mediating the hypothesized relationship between social avoidance and alcohol-related problems, allowing for a replication and extension to *social avoidance* of the Buckner and Shah (2015) findings.

I hypothesized: (a) Social avoidance would be unrelated or negatively related to alcohol consumption levels (Ham et al., 2007; Lewis et al., 2008; Stewart et al., 2006); (b) Social avoidance would be positively related to alcohol-related problems (Stewart et al., 2006); and (c) Conformity motives and CAM would independently mediate the concurrent relations of social avoidance to alcohol-related problems (Buckner & Shah, 2015; Ham et al., 2009; Stewart et al., 2006).

Method

Participants

Participants were 263 undergraduates at an eastern Canadian university. Participants were screened for status as a drinker (i.e., consuming alcohol at least four times per month; Grant et al., 2009), because reporting one's drinking motives requires

one to be a drinker. I selected participants who were 26 years of age or younger to ensure generalizability to a typical university population (see Buckner & Shah, 2015). This eliminated 15 participants from the original sample (age range 27-50 years, $M = 33.47$, $SD = 8.28$), resulting in the final sample size of 263. Participants' ages ranged from 17-26 years ($M = 20.14$, $SD = 2.07$), 90.1% identified as Caucasian (other ethnicities included 3.1% Asian Canadian, 1.1% Black Canadian, 1.1% Hispanic, 0.8% Canadian Aboriginal, and 3.8% other), and 73.1% of the sample were female. On average, participants had completed 2.3 years of university ($SD = 1.30$).

Materials

Liebowitz Social Anxiety Scale - Avoidance Subscale (LSAS-A; Liebowitz, 1987; see Appendix C). My chosen measure of social anxiety was the LSAS-A. This measure has 24 items that assess fear-mediated social avoidance, with participants rating their levels of avoidance on each item using a 4-point scale from 0 (“*never*”) to 3 (“*usually*”). This scale has demonstrated strong internal consistency with Cronbach alpha coefficients ranging from .81 to .96 (Heimberg et al., 1999).

Modified Drinking Motives Questionnaire- Revised (Grant et al., 2007; see Appendix D). This is a 28-item self-report questionnaire that yields scores on five subscales each representing a distinct motive for alcohol consumption: social, enhancement, conformity, CAM, and CDM. Participants rate how often they consume alcohol for specific reasons on a 5-point scale from 1 (“*almost never/never*”) to 5 (“*almost always/always*”). Subscale scores are calculated as item means. The modified DMQ-R possesses excellent psychometric properties (Grant et al., 2007). For example, it possesses the expected five-factor structure and subscale internal consistencies range

from an acceptable Cronbach alpha of .73 to an excellent alpha of .89 (Grant et al., 2007).

Alcohol Use. Drinking quantity (how much alcohol one consumes during a typical drinking episode) was measured using a single item measure (Grant & Stewart, 2007) embedded in a lifestyle questionnaire (see Appendix E). Participants were asked to reflect on their drinking behaviours in the past 30 days. The questionnaire also contained questions on caffeine use, cigarette smoking, and exercise. Evidence suggests self-report measures of drinking behaviour accurately reflect actual drinking when embedded in other questions to reduce their salience, when questions are open-ended, and when confidentiality is assured (Sobell & Sobell, 1990)—conditions that were met in this study.

Rutgers Alcohol Problem Index (RAPI; White & Labouvie, 1989; see Appendix F). This 23-item questionnaire assesses severity of problems related to alcohol consumption (e.g., “Not able to do your homework or study for a test,” “Went to work or school high or drunk”), and is specifically designed to assess for the kinds of alcohol-related problems relevant for young people. Responses are scored on a 5-point scale from 0 (“*never*”) to 4 (“*more than 8 times*”). A total score is created by summing all items. This measure possesses adequate validity in undergraduates (Martens, Neighbors, Dams-O’Connor, Lee, & Larimer, 2007).

Procedure

The Health Sciences Research Ethics Board at the university where the study was conducted approved this study. Participants were recruited through the Psychology Department participant pool via an online database. Participants were invited to the lab to provide informed consent and to complete questionnaires on a computer. Measures included, but were not limited to, those mentioned above. Participants received

compensation of \$10 or 1 course credit point for participation.

Analysis Plan

Path analysis was performed using Mplus 7.3 (Muthen & Muthen, 2012) to test the extent to which each of the negative reinforcement drinking motives (conformity, CAM, and CDM) mediated the relation between social avoidance and alcohol-related problems. I restricted mediators to the negative reinforcement motives since these motives are most frequently implicated in explaining the SAD-AUD relationship. These three drinking motives as well as alcohol-related problems were all negatively skewed, and so MLR correction was used. This is an approach which uses all available data for a given case under the assumption that data are missing at random, which allows for missingness to be related to variables included in the analyses (Little & Rubin, 2002). MLR also offers protection against inflated alpha values because of incomplete data and non-normality (Savalei, 2010). All mediation analyses controlled for age, gender, and drinking quantity. Missing data was handled in Mplus using full-information maximum likelihood (FIML), which uses all available information from participants.

Results

Pearson's product-moment correlation coefficients were calculated to examine the bivariate relationships between social avoidance, drinking motives, and drinking behaviours and problems in this sample (see Table 2.1 for correlations, means, standard deviations, and Cronbach's alphas). The Cronbach's alpha reliabilities for the current study ranged from .67 to .91. Loewenthal (1996) argues that a cut-off of .60 should be used to assess for adequate reliability with short scales, as was used in this study to assess for drinking motives. Social avoidance was significantly and positively correlated with

conformity motives, CAM, and CDM (but not with social or enhancement motives), and with alcohol-related problems (but not with quantity of alcohol consumed).

The multiple mediator model being tested (see Figure 2.1) was a just identified model and so fit indices are not reported. CDM emerged as a full mediator ($\beta = 0.07, p = 0.02$) while neither conformity ($\beta = 0.02, p = 0.47$) nor CAM motives ($\beta = 0.02, p = 0.52$) proved a significant mediator. See Table 2.2 for all indirect effects.

Discussion

Consistent with my first two hypotheses and with social anxiety research (Ham et al., 2007; Lewis et al., 2008; Stewart et al., 2006), social avoidance was related to elevated levels of alcohol-related problems, even though social avoidance was unrelated to drinking quantity. This suggests something other than elevated drinking quantity must explain the relationship of social avoidance to drinking problems. I investigated negative reinforcement drinking motives as one such set of mediating variables.

Study 2a indicated individuals with high levels of social avoidance experience elevated levels of alcohol-related problems due to using alcohol to cope with negative affect, specifically, dysphoric mood. These results fit with the self-medication hypothesis (Khantzian, 1997), which states certain individuals are vulnerable to developing alcohol-related problems due to using alcohol to self-medicate. Study 2a suggests the self-medication process for socially avoidant individuals unexpectedly involves self-medicating to deal with dysphoric mood rather than with anxiety specifically.

Social avoidance is positively correlated with depression (Dalbudak et al., 2013), possibly due to the social isolation that occurs. This may help explain why individuals with high levels of social avoidance drink to cope with depressed mood. Specifically, in a

study of 319 undergraduates, after controlling for anxiety, harm avoidance, self-directedness, and alexithymia symptoms, the social avoidance subscale of the LSAS (Liebowitz, 1987) was related to depression on the Beck Depression Inventory (Beck, Ward, Mendelson, Mock, & Erbaugh, 1961) whereas the social fear LSAS subscale was not (Dalbudak et al., 2013). The use of a social avoidance measure as a social anxiety indicator in Study 2a may explain why my results diverge from those of Buckner and Shah (2015) who did not find support for CDM as a mediator of the social anxiety – alcohol-related problems relationship.

These results also differed from Stewart and colleagues (2006) and Lewis and colleagues (2008) who found the relationship between social anxiety and alcohol-related problems was mediated not only by drinking to cope (broadly) but also by conformity motives. My results indicated it was only CDM specifically that mediated the social avoidance to alcohol-related problems relationship, with conformity motives failing to emerge as an independent mediator. This finding suggests conformity motives may not be relevant for the problematic drinking of individuals high in social avoidance.

While the lack of mediation by CAM is somewhat surprising, it is possible the CAM drinking motives measure used in this study (Grant et al., 2007) did not adequately assess the type of anxiety that socially anxious individuals drink to cope with, namely, state social anxiety. Thus, it will be important to test the potential mediating role of motives involving drinking to cope with state social anxiety (CSAM). Perhaps CSAM will be a better mediator of alcohol-related problems in socially anxious individuals as compared to CAM more broadly. Preliminary research examined the role of CSAM in males with an alcohol use disorder (R. Cooper et al., 2014) and in undergraduates

(Cludius et al., 2013). R. Cooper et al. (2014) found males with comorbid SAD-AUD reported higher levels of CSAM than those with an AUD alone. Cludius et al. (2013) found CSAM, but not social anxiety itself, was linked to university students' alcohol misuse. Further research is needed to examine CSAM as a mediator of the social anxiety – problematic drinking relationship.

Finally, Study 2a did not test the role of drinking contexts, though research is increasingly recognizing the role of heavy drinking in specific risky contexts (e.g., before sexual intercourse or when experiencing high levels of negative mood) as setting individuals up for alcohol-related problems (e.g., Keough et al., 2016). Perhaps CDM helps explain the relation between social avoidance and alcohol-related problems because socially avoidant people drink at home alone when feeling depressed, for example, rather than drinking in more normative convivial social drinking contexts.

Study 2b replicates and extends the findings of Study 2a while considering CSAM along with the other negative reinforcement motives (i.e., CAM, CDM, and conformity) as mediators, and while adding in drinking context variables as another relevant set of potential mediators of the social avoidance – alcohol-related problems relation.

Study 2b: Simultaneous Investigation of the Role of Drinking Motives and Contexts

in Mediating the Relationship Between Social Avoidance and Alcohol Problems

Research suggests negative reinforcement drinking motives mediate the relation between social anxiety and alcohol-related problems, with some studies finding the significant mediators are conformity motives (Villarosa et al., 2014), coping motives (Ham et al., 2009), or both (Lewis et al., 2008; Stewart et al., 2006). Research has begun to explore an additional subcategory of the generic coping motive construct, beyond the

earlier-described coping with anxiety motives (CAM) vs. coping with depression motives (CDM) distinction (Grant et al., 2007). Attention is being given to drinking motivated by the specific desire to cope with state *social* anxiety (CSAM; R. Cooper et al., 2014; Stevens & Gerlach, 2009; Wagner et al., 2004). These distinctions between various coping motives subcategories may be helpful when applied to exploring the link between social anxiety and alcohol-related problems as they allow researchers to determine if socially anxious individuals drink to cope with anxiety in general, social anxiety in particular, depression, or some combination of the three. This distinction may be beneficial for future research and clinical work to target the appropriate coping motive(s) in interventions with socially anxious individuals with alcohol-related problems.

One study that investigated CSAM in students found it was this motive that was related to increased alcohol-related problems, rather than social anxiety itself (Cludius et al., 2013). However, high social anxiety scores predicted higher endorsement of CSAM, which increased the risk for hazardous alcohol use (Cludius et al., 2013), providing preliminary evidence of CSAM as a mediator of the social anxiety to problematic alcohol use link in students. Another study found CSAM mediated the relationship between social anxiety and alcohol-related problems in socially anxious participants. Those who were high in social anxiety reported more drinking to cope in social situations, avoiding social situations if alcohol was unavailable, and a higher number of alcohol-related problems, than non-socially anxious individuals (Buckner & Heimberg, 2010).

Another factor deemed important in the link between social anxiety and alcohol-related problems is drinking context. Buckner and colleagues (2006) studied drinking motives and drinking context in 293 undergraduates. They found social anxiety was

correlated with heavy drinking in several high-risk contexts (unpleasant emotions, conflict with others, social pressure, and when testing personal control). They also showed each of these drinking contexts independently mediated the relationship between social anxiety and alcohol-related problems. Another study by Terlecki and Buckner (2015) found negative reinforcement drinking motives (generic coping and conformity motives) mediated the relationship between social anxiety and drinking heavily in specific social-anxiety relevant contexts (i.e., negative emotional situations, e.g., after a fight; and personal/intimate situations, e.g., before sexual intercourse). Drinking heavily in these two risky drinking contexts (i.e., negative emotional and personal/intimate) mediated the relationship between social anxiety and alcohol-related problems. However, Terlecki and Buckner (2015) did not distinguish between subsets of coping motives. Thus, Study 2b extended prior research by investigating the mediating role of various specific coping motives (i.e., CAM, CDM, and CSAM) in a single model. The Terlecki and Buckner (2015) study also did not test drinking motives and drinking context together as mediators in a single model. In Study 2b, using path analysis to investigate chained mediation with motives and context entered simultaneously allowed me to test if it is motives, context, or both in sequence that mediate the relation between social avoidance and alcohol-related problems.

Study 2b further investigated the possible mediating role of drinking motives and drinking contexts in explaining the relationship between social anxiety and alcohol-related problems. To extend prior research, Study 2b included all three coping motives (CAM, CDM, and CSAM) and conformity motives. I hypothesized there would be a positive association between social avoidance and alcohol-related problems and this

relationship would be mediated by all four negative reinforcement motives (conformity, CAM, CDM, and CSAM) and both social-anxiety relevant drinking contexts (negative emotional and personal/intimate). I also hypothesized social anxiety would lead individuals to drink for negative-reinforcement reasons and those reasons would lead to situation specific heavy drinking, which would in turn contribute to their experience of alcohol-related problems in a chained mediation fashion. I hypothesized social avoidance would be associated with alcohol-related problems through coping motives (anxiety, depression, and social anxiety) which would subsequently increase the likelihood of drinking in negative emotional contexts. I also hypothesized social avoidance would be associated with alcohol-related problems through coping with social anxiety motives as well as conformity motives which would subsequently increase the likelihood of drinking in personal/intimate contexts. I also tested single mediator models (i.e., examining drinking motives or drinking contexts alone in mediating the relation of social avoidance to alcohol-related problems, rather than motives and context sequentially mediating in a chained mediation model).

Method

Participants

Participants were 189 undergraduates at an eastern Canadian university who were recruited via an online psychology research database. Participants were screened for status as a “drinker” (which was defined as in Study 2a), and were required to be 26 years of age or younger to ensure generalizability to a typical university population (see Study 2a). Participants were 19.9 years old on average ($SD = 1.7$) and had completed 2.2 years of university ($SD = 1.2$) on average. The sample was 76.7% female and 91.0% Caucasian

(other ethnicities included 2.6% Asian Canadian, 1.6% Black Canadian, and 4.8% other).

Materials

As in Study 2a, typical alcohol use patterns were measured with an author-compiled questionnaire, social avoidance was measured with the LSAS-A (Liebowitz, 1987), drinking motives were measured with the M DMQ-R scales (Grant et al., 2007), and alcohol-related problems were measured with the RAPI (White & Labouvie, 1989). Description of measures used only in Study 2b follows.

Drinking due to Social Anxiety Questionnaire (DDSAQ; Wagner et al., 2004; see Appendix G). The DDSAQ is a 28-item self-report measure that assesses coping with social anxiety motives for drinking (CSAM). Participants are asked to rate items in terms of how characteristic each was of them in the last month on a 5-point scale from 0 (“*not at all*”) to 4 (“*extremely*”). The DDSAQ total score was based on the average of the item scores to make it comparable to the M DMQ-R subscale scores. The questionnaire is a reliable and valid measure of drinking motivated by the desire to self-medicate social anxiety (Stevens & Gerlach, 2009; Wagner et al., 2004).

Drinking Context Scale-Revised (O’Hare, 1997; see Appendix H). The DCS-R is a 23-item self-report measure assessing an array of contexts in which heavy drinking behaviours occur in undergraduates. Participants are asked to rate the chances that they might find themselves drinking heavily in 23 different circumstances on a 5-point scale from 1 (“*extremely low*”) to 5 (“*extremely high*”). The questionnaire is made up of three distinct factors—convivial drinking (e.g., “when I’m at a bar or club”), personal/intimate drinking (e.g., “when I’m on a date”), and negative emotional drinking (e.g., “when I’m lonely or homesick”). These three factors have been shown to have excellent internal

reliabilities, ranging from .90 to .94 (O'Hare, 1997). All items were administered; however, only personal/intimate and negative emotional drinking contexts were examined given their relevance to the social anxiety – alcohol-related problems relationship (see Terlecki & Buckner, 2015). The DCS-R subscale scores are based on the average of the item scores that comprise each subscale.

Procedure

The Health Sciences Research Ethics Board at the university where the study was conducted approved this study. If participants were eligible to participate in the study (see earlier description of eligibility), they could see the study advertised on the university's online psychology study database. Interested and eligible students provided informed consent electronically and were then able to complete the questionnaires mentioned above online on their personal computers. Participants were granted 0.5 credit point toward an eligible psychology class upon completion of the questionnaires as compensation. An online debriefing form was given that provided contact information for the researchers in case participants had any questions or concerns.

Plan of Analysis

Path analysis was performed using Mplus 7.3 (Muthen & Muthen, 2012) to test the extent to which each of the negative reinforcement drinking motives (conformity, CAM, CDM, and CSAM), and in turn drinking contexts (personal/intimate and negative emotional), mediated the relationship between social avoidance and alcohol-related problems in a chained mediation fashion. Drinking quantity was controlled for given the overlap with the outcome (alcohol-related problems) as were age and gender. MLR correction was used in analyses. Standard indices were used to assess model fit; RMSEA

$\leq .08$ and $CFI \geq .90$ were used to delineate adequate fit (Hu & Bentler, 1999). Missing data was handled in Mplus using FIML.

Results

Pearson's product-moment correlation coefficients were calculated to examine the bivariate relationships between social avoidance, drinking motives variables, drinking context variables, and alcohol-related problems. Internal negative reinforcement drinking motives (CAM, CDM, and CSAM) had higher inter-correlations than with the external negative reinforcement drinking motive (conformity), although all motive inter-correlations were significant. Conformity motives were correlated with personal/intimate drinking contexts, but not with the negative emotional drinking context, which is a potentially more solitary drinking context. Social avoidance was significantly correlated with conformity motives, CAM, CDM, CSAM, and drinking in negative emotional contexts, personal/intimate contexts, as well as with alcohol-related problems (see Table 2.3 for means, standard deviations, Cronbach's alphas, and correlations). All Cronbach's alphas were acceptable (range of .74 to .93).

The hypothesized model provided a good fit to the data, $\chi^2(2) = 3.991, p = .14$; $RMSEA = .08$, 90% CI [.00, .18], $CFI = 0.996$. Of the single mediator models tested (with drinking motives or drinking contexts entered alone as mediators), only CSAM and CDM were significant mediators in the relation between social avoidance and alcohol-related problems (see Table 2.4 and Figure 2.2). In the full model (see Figure 2.2), only one of the five hypothesized chained mediational pathways was supported. Specifically, CSAM, and in turn drinking in personal/intimate contexts, mediated the relation between social avoidance and alcohol-related problems (see Table 2.4 and Figure 2.2). All other

paths were non-significant (indirect effects ranging from -0.04 – 0.02 and all p values > .05).

Supplementary Analyses

Additional analyses were conducted to test the potential mediating role of drinking motives in the relationship between social avoidance and heavy drinking in risky contexts (i.e., personal/intimate contexts and negative emotional contexts) to provide a conceptual replication of Terlecki and Buckner (2015). These analyses indicated CDM significantly mediated the relationship between social avoidance and drinking in negative emotional contexts ($\beta = 0.09, p = 0.01$). CSAM significantly and independently mediated the relationship between social avoidance and drinking in negative emotional contexts ($\beta = 0.11, p = 0.00$) as well as drinking in personal/intimate contexts ($\beta = 0.16, p = 0.00$). See Table 2.4 for all indirect effects.

Discussion

Study 2b suggested CDM and CSAM independently mediate the link between social avoidance and drinking problems. Students with high levels of social avoidance experience higher levels of alcohol-related problems due to their higher levels of two specific negative reinforcement drinking motives, i.e., drinking to cope with social anxiety and drinking to cope with depression. This replicates results of Study 2a by showing in an independent sample that drinking to cope with depression helps explain the problematic drinking of socially avoidant undergraduates. It also extends Study 2a by showing drinking to cope with anxiety also matters in explaining this relation, but it is drinking to cope with a specific form of anxiety (i.e., social anxiety) rather than drinking to cope with anxiety generally, that is additionally relevant in explaining the increased

problems with alcohol experienced by socially avoidant students.

Study 2b also provided important information on why students with higher levels of social avoidance consume alcohol heavily in potentially problematic contexts, i.e., during periods of high negative emotionality and during personal or intimate times. I found socially avoidant students' motivations to drink to cope with social anxiety and cope with depression independently explained their tendency to drink heavily in negative emotional contexts while their motivations to drink to cope with social anxiety uniquely explained their tendency to drink heavily in personal/intimate contexts.

Only one of the five hypothesized chained mediational pathways explained the relation of social avoidance to alcohol-related problems, namely, the CSAM to personal/intimate contexts path. This means that social avoidance was associated with a higher likelihood of drinking to cope with social anxiety, which in turn predicted a higher likelihood of drinking in personal/intimate contexts, which then resulted in higher levels of alcohol-related problems. For the remaining pathways, it was not the drinking context itself that explained socially anxious undergraduates' elevated alcohol-related problems but rather their reasons for drinking. This may indicate that previous findings that drinking contexts are a mediator of the relationship between social anxiety and alcohol-related problems (Buckner et al., 2006) were secondary to the correlation between drinking contexts and motives. Except for one significant chained mediation pathway (CSAM leading to drinking in personal/intimate contexts, which then leads to alcohol-related problems), when motives were included in the model in Study 2b, drinking context was no longer a significant mediator. This is largely consistent with Cooper and colleagues' (2015) predictions regarding drinking motives being the final common

pathway to alcohol-related problems.

The one exception, that CSAM led to heavy drinking in personal/intimate contexts, which in turn led to alcohol-related problems, is consistent with some prior research. A study indicated that individuals with high levels of social anxiety who consumed more alcohol in personal/intimate contexts and negative emotional contexts experienced more alcohol-related problems (Terlecki et al., 2014). However, when both mediators were entered simultaneously, only personal/intimate drinking contexts were found to be a significant mediator, indicating this context may be more relevant in explaining alcohol-related problems in socially anxious individuals (Terlecki et al., 2014). These researchers stated a relevant factor is that personal/intimate contexts can include sexual relations, and that heavier drinking prior to engaging in sexual relations may increase the likelihood of risky sexual behaviours (e.g., unsafe sex). These results suggest socially avoidant people consume alcohol more than others in both negative emotional contexts and personal/intimate contexts, but it is their increased drinking in the latter context that has the greater potential for causing alcohol-related problems.

Prior research found drinking heavily in specific contexts (negative emotional contexts and personal/intimate contexts) mediated the relationship between social anxiety and alcohol-related problems (Terlecki & Buckner, 2015). This same study also found coping and conformity motives mediated the relationship between social anxiety and drinking heavily in these same contexts (Terlecki & Buckner, 2015). However, this prior study did not distinguish between the different coping motives. It also did not investigate drinking motives and drinking context in a multiple mediator model and so it was not determined whether it was motive, context, or both sequentially that truly mediated the

relationship between social anxiety and alcohol-related problems. The current study replicated and extended the Terlecki and Buckner (2015) study by determining that it is drinking to cope with depression and social anxiety that are leading to drinking in problematic contexts for socially avoidant students, and that it is primarily the underlying motive that is leading to alcohol-related problems, rather than the context in which the drinking is taking place.

Research has investigated drinking to cope with social anxiety in students and found it was this motive that was related to a higher number of alcohol-related problems, whereas social anxiety itself was not (Cludius et al., 2013). Other studies have found individuals who were high in social anxiety used alcohol to cope with their social anxiety and CSAM was a mediator in the relation between social anxiety and alcohol-related problems (Buckner & Heimberg, 2010). Study 2b replicated and extended these findings to social avoidance, with social avoidance being related to alcohol-related problems through CSAM as well as CDM.

One limitation of Study 2b is that there may be redundancy between the coping motives and heavy drinking in negative emotional contexts measures (e.g., “drinking because it helps me when I am feeling depressed” on the Modified DMQ-R, and “drinking excessively in a circumstance such as when I’m feeling sad, depressed, or discouraged” on the DCS-R). This potential redundancy is a possible reason for why this context did not emerge as a significant independent mediator in a model including drinking motives.

Another limitation is that the measure used to assess drinking context in the current study did not assess whether individuals were consuming alcohol with others or if

it involved risky solitary alcohol consumption. Cross-sectional research investigating the role of social versus solitary drinking contexts found that individuals with high levels of social anxiety were more likely to engage in solitary drinking prior to social events and that this in turn predicted alcohol-related problems (Keough et al., 2016). Keough et al. (2016) did not investigate the role of drinking motives but it may be that among socially anxious individuals, drinking to cope with depression leads to heavy drinking in solitary drinking contexts, which in turn results in alcohol-related problems.

Future research should investigate these relationships in a daily diary design. It may be that context moderates the relation of drinking motives to problematic alcohol consumption in socially anxious individuals. For example, socially anxious individuals may only drink heavily if they are conformity motivated when they are in a high conformity drinking context such as at a bar or a party. A longitudinal design would be beneficial as well, as it may be that the mediating impact of drinking contexts are only seen when investigated over time. Drinking motives may be the only variable driving the relationship between social anxiety and alcohol-related problems concurrently, but it is possible that motives influence heavy drinking in specific contexts over time, which in turn contributes to the development of alcohol-related problems over time.

Overall, results show that socially avoidant individuals experience increased alcohol-related problems due to their increased tendencies both to drink to cope with social anxiety and to cope with dysphoric mood. Their higher levels of these problematic drinking motives lead to higher levels of heavy drinking in risky contexts as well, with CSAM leading to increased heavy drinking in personal/intimate contexts, and both CSAM and CDM independently leading to increased heavy drinking in negative

emotional contexts. However, consistent with Cooper et al.'s (2015) predictions regarding the proximal role of drinking motives, it was primarily drinking motives (i.e., CSAM and CDM) rather than heavy drinking in social-anxiety relevant contexts that proved to be the explanatory link between social avoidance and alcohol-related problems.

General Discussion

The current set of studies indicates CDM mediated the cross-sectional relationship between social avoidance and alcohol-related problems (Study 2a and 2b), and CSAM independently mediated this same relationship (Study 2b). The CSAM results are perhaps not surprising, given research has found similar results (Buckner & Heimberg, 2010) and theory postulating individuals with high levels of social avoidance, a measure of social anxiety, consume alcohol to cope with their social anxiety and therefore experience alcohol-related problems because of this maladaptive coping. The finding that CDM independently mediated this relationship may at first appear surprising and was not initially hypothesized. However, this robust finding from both of the present studies is likely due to the measure of social anxiety that I used, i.e., social avoidance. Different measures of social anxiety are differentially linked to distinct alcohol variables (e.g., Stewart et al., 2006). Socially avoidant individuals may use alcohol to cope with social situations they would otherwise avoid if alcohol was not available, and they may also spend time at home alone due to their social avoidance. High levels of social avoidance may lead to depression due to the resulting social isolation, and then socially avoidant individuals may begin to drink to cope with depressed mood in addition to social anxiety.

Implications

The results of the current studies indicate the importance of targeting drinking

motives in preventing or treating alcohol-related problems for those with high levels of social avoidance. The current study found that social avoidance was not associated with increased alcohol consumption, which is similar to previous research (Ham et al., 2007; Lewis et al., 2008; Stewart et al., 2006). But, regardless of the amount of alcohol typically consumed, socially anxious individuals are at a higher risk for developing alcohol-related problems, which may persist beyond university (Ham et al., 2009). Prior research has found that social anxiety levels among students undergoing a brief alcohol intervention were related to poorer outcomes (R. Cooper et al., 2014). The current studies indicate that socially avoidant students experience a higher number of alcohol-related problems due to their tendencies to use alcohol to cope with both social anxiety and depression. These same motives also lead socially avoidant students to engage in increased heavy drinking in certain risky contexts. Socially avoidant students should be helped to understand the link between problematic drinking motives and negative outcomes such as heavy drinking in risky contexts and alcohol-related problems. Teaching socially avoidant undergraduates to identify why they are consuming alcohol and how to manage their negative mood, specifically their depressed mood, without alcohol may be most beneficial. Focusing on the social anxiety may also be helpful when treating socially avoidant students as increasing their ability to manage social situations without alcohol can be beneficial for both their social anxiety and their alcohol-related problems. These latter skills may be most relevant and useful when applied in personal/intimate contexts given the chained mediational results observed in Study 2b.

Limitations

The cross-sectional nature of the current studies limits the ability to determine

directionality and temporal precedence of the relationships studied. A longitudinal design represents a crucial next step in testing mediation over time. Another limitation is that participants were at a range of time points in their university career when they participated in the current studies, meaning it was not possible to determine if the relationship found was specific to a certain stage of the university experience. The current studies also relied on undergraduates and so may not be generalizable to older adults, young adults not in university, or to clinical samples of patients with social anxiety and/or an alcohol use disorder.

Conclusion

Results from this set of studies indicate CDM and CSAM independently mediate the cross-sectional relationship between social avoidance and alcohol-related problems in undergraduates. These two motives also explain heavy alcohol consumption in risky negative reinforcement drinking contexts, but heavy drinking in these “risky” contexts generally do not explain alcohol-related problems once motives are considered.

Table 2.1. Correlations, Means, Standard Deviations, and Cronbach's Alphas for Social Avoidance, Drinking Motives, Alcohol Problems, and Drinking Quantity (Study 2a)

	1	2	3	4	5	6	7	8
1. Social avoidance	-							
2. Coping with anxiety motives	.27**	-						
3. Coping with depression motives	.28**	.63**	-					
4. Conformity motives	.25**	.39**	.42**	-				
5. Social motives	.05	.43**	.16*	.38**	-			
6. Enhancement motives	.04	.43**	.26**	.25**	.56**	-		
7. Alcohol problems	.17**	.28**	.33**	.24**	.28**	.42**	-	
8. Drinking quantity	-.06	.04	-.08	.04	.22**	.29**	.31**	-
Cronbach's alpha	.91	.69	.91	.85	.67	.76	.89	-
Means	15.09	1.96	1.41	1.31	3.11	2.76	10.50	5.17
Standard deviation	10.95	0.80	0.62	0.55	0.78	0.85	9.67	2.63

Note. ** $p < .01$ * $p < .05$.

Table 2.2. Standardized Indirect Effects of Social Avoidance on Alcohol Problems through Mediators (Study 2a)

Independent variable	Mediator	Dependent variable	β	SE	p
Social avoidance	Conformity	Alcohol problems	0.02	0.03	0.47
	Coping with anxiety		0.02	0.03	0.52
	Coping with depression*		0.07	0.03	0.02

Note. β = standardized beta weight. * indicates significant mediation.

Table 2.3. Correlations, Means, Standard Deviations, and Cronbach's Alphas Among Social Avoidance, Drinking Motives, Drinking Contexts, and Alcohol Problems (Study 2b)

	1	2	3	4	5	6	7	8	9
1. Social avoidance	-								
2. Coping with anxiety motives	.23**	-							
3. Coping with depression motives	.18*	.68*	-						
4. Conformity motives	.19*	.24**	.29**	-					
5. Coping with social anxiety motives	.43**	.61**	.50**	.28**	-				
6. Negative emotional context	.27**	.49**	.56**	.09	.49**	-			
7. Personal/intimate context	.23**	.43**	.39**	.19*	.49**	.55**	-		
8. Alcohol problems	.15*	.38**	.52**	.27**	.50**	.38**	.44**	-	
9. Drinking quantity	-.11	.11	.14	.03	.05	.03	.14	.23**	-
Cronbach's alpha	.92	.74	.93	.80	.93	.88	.84	.90	--
Means	21.71	1.96	1.41	1.36	0.81	1.74	2.37	8.64	5.65
Standard deviation	13.32	0.81	0.63	0.53	0.56	0.80	0.65	8.91	4.47

Note. ** $p < .01$ * $p < .05$.

Table 2.4. Standardized Indirect Effects of Social Avoidance on Alcohol Problems through Mediators (Study 2b)

Independent variable	Mediator(s)	Dependent variable	β	SE	p
Social avoidance	Conformity	Alcohol problems	0.02	0.01	0.27
Social avoidance	Coping with anxiety	Alcohol problems	-0.04	0.03	0.09
Social avoidance	Coping with depression*	Alcohol problems	0.08	0.03	0.02
Social avoidance	Coping with social anxiety*	Alcohol problems	0.14	0.04	0.00
Social avoidance	Personal/intimate context	Alcohol problems	0.00	0.01	0.81
Social avoidance	Negative emotional context	Alcohol problems	0.00	0.01	0.82
Social avoidance	Coping with social anxiety	Alcohol problems	0.00	0.01	0.81
	Negative emotional context				
Social avoidance	Coping with depression	Alcohol problems	0.00	0.01	0.81
	Negative emotional context				
Social avoidance	Coping with anxiety	Alcohol problems	0.00	0.00	0.92
	Negative emotional context				
Social avoidance	Conformity	Alcohol problems	0.00	0.00	0.27
	Personal/intimate context				
Social avoidance	Coping with social anxiety*	Alcohol problems	0.03	0.02	0.05
	Personal/intimate context				
Social avoidance	Coping with depression*	Negative emotional context	0.09	0.03	0.01
Social avoidance	Coping with social anxiety*	Negative emotional context	0.11	0.04	0.00
Social avoidance	Coping with depression	Personal/intimate context	0.04	0.02	0.06
Social avoidance	Coping with social anxiety*	Personal/intimate context	0.16	0.04	0.00

Note. β = standardized beta weight. * indicates significant mediation.

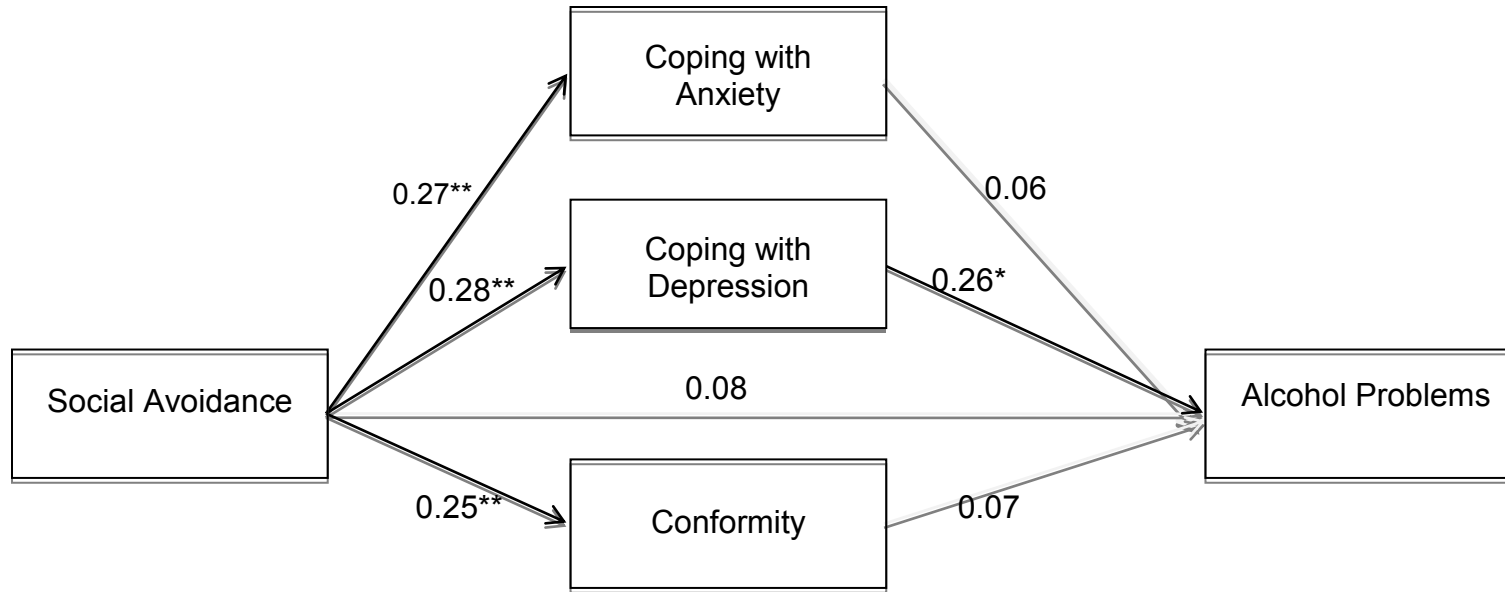


Figure 2.1. Multiple mediators model. Conformity, coping with anxiety, and coping with depression motives simultaneously entered as mediators of the relationship between social avoidance and alcohol problems (Study 2a).

Note. Standardized estimates are shown. ** $p < .001$, * $p < .01$.

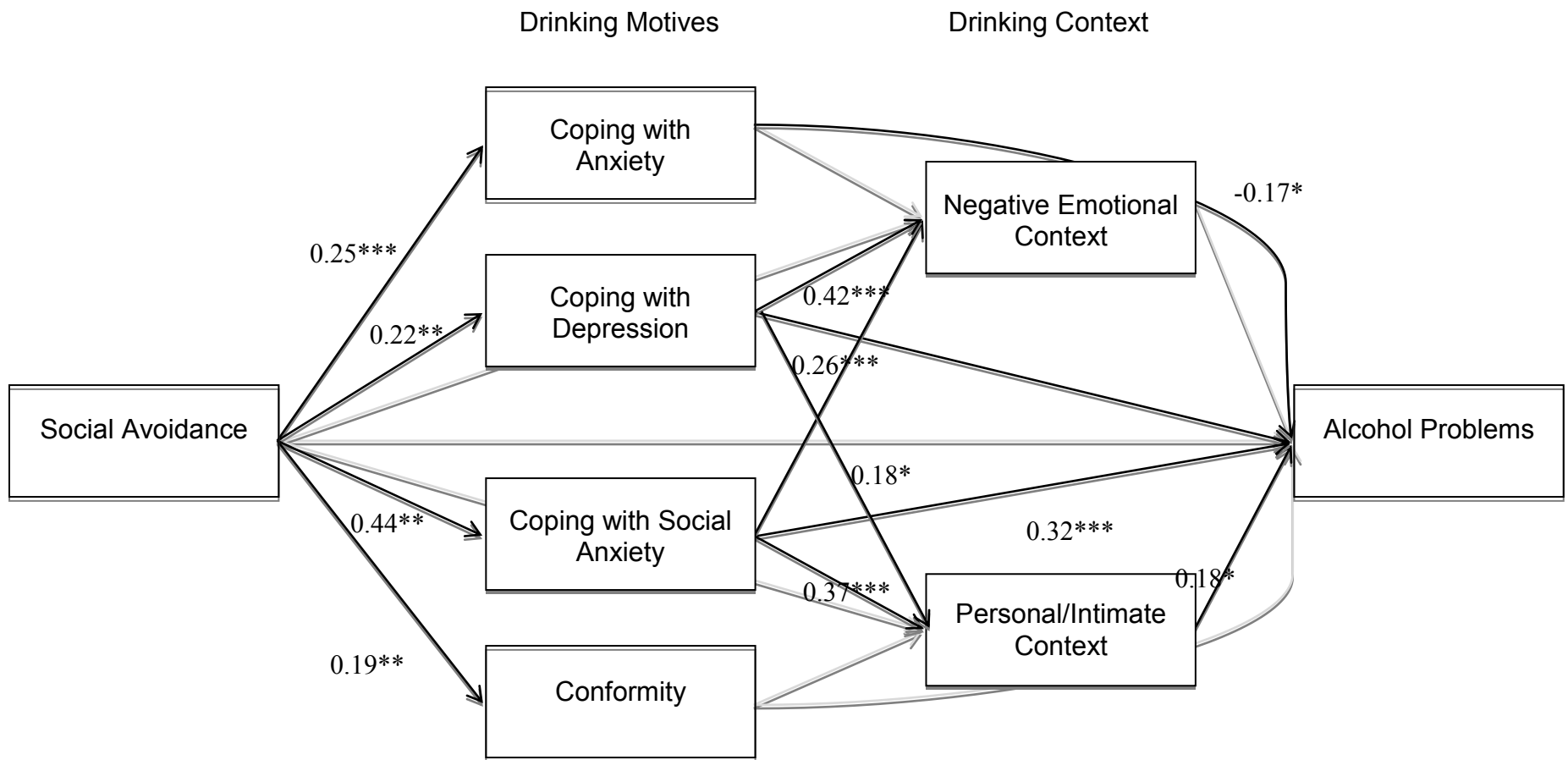


Figure 2.2. Multiple mediator chained mediation model with drinking motives (coping with anxiety, coping with depression, coping with social anxiety, and conformity) and then drinking context (personal/intimate and negative emotional) entered as sequential mediators of the relationship between social avoidance and alcohol problems (Study 2b).

Note. Standardized estimates are shown. *** $p < .001$, ** $p < .01$, * $p < .05$.

CHAPTER 5. PROLOGUE TO STUDY 3

Study 2a and Study 2b revealed that CDM and CSAM independently mediate the cross-sectional relationship between social avoidance and alcohol-related problems among undergraduates. The CDM results were somewhat surprising, as CAM were hypothesized to be the primary mediator. As highlighted in the previous chapter, this is likely at least partially due to my choice of social avoidance as the social anxiety measure of interest and the high overlap of social avoidance and depression (Dalbudak et al., 2013). However, given that mediation involves change over time, it then became important to investigate this same relationship in a longitudinal study. Cross-sectional tests of mediation are proposing to reveal changes that occur over time, but all variables are measured concurrently, making it difficult to say with certainty that true mediation is occurring. Prior research has shown that while cross-sectional examinations of mediation are extremely common and widely accepted in literature, they are also inherently biased (Maxwell & Cole, 2007). These researchers showed that cross-sectional tests of mediation often do not accurately capture if there is truly mediation, or the strength of the mediation (Maxwell & Cole, 2007). They also showed that it is difficult, if not impossible, to determine in what way the cross-sectional results will be biased (i.e., will it appear mediation is stronger or weaker than is actually the case?; Maxwell & Cole, 2007).

The next important step in this research was thus to examine the potential mediating role of the negative reinforcement drinking motives that have consistently been shown to mediate the relationship between social anxiety and alcohol-related problems in cross-sectional research (Buckner & Shah, 2015; Ham et al., 2009; Lewis et al., 2008;

Stewart et al., 2006; Villarosa et al., 2014) using a longitudinal design. The remaining drinking motives (social motives and enhancement motives) were also included in order to expand on Study 2a and Study 2b and to determine if the positive reinforcement drinking motives play a mediating role in this relationship as well. Study 3 investigated the role of changes in conformity motives, CAM, CDM, social motives, and enhancement motives in explaining the relationship between social avoidance and changes in alcohol-related problems over time in order to capture whether true mediation is actually occurring or whether my prior results in Study 2a were impacted by a biased statistical design.

CHAPTER 6. STUDY 3: DRINKING TO COPE WITH DEPRESSION MEDIATES
THE RELATIONSHIP BETWEEN SOCIAL ANXIETY AND ALCOHOL
PROBLEMS: A 3-WAVE, 18-MONTH LONGITUDINAL STUDY⁷

Abstract

Undergraduates with high levels of social anxiety have increased alcohol-related problems, despite equal or lower alcohol consumption levels. Drinking motives mediate the relationship between social anxiety and alcohol-related problems, with coping and conformity motives being the most commonly observed mediators. Most research in this area is limited by use of a cross-sectional design. This study extended prior research by using a longitudinal design. This study also extended most research by examining coping with anxiety motives (CAM) and coping with depression motives (CDM) separately using path analysis. I collected data from 219 undergraduates (72.6% women) over three waves spaced six months apart. Results indicated CDM mediated the relationship between social avoidance and alcohol-related problems. Social avoidance is associated with depression, possibly in part due to social isolation, and this study revealed that socially avoidant people's escalations in CDM explain their increased alcohol-related problems over time.

⁷ This manuscript is adapted from 'Collins, J. L., Thompson, K., Glowacka, M., Sherry, S. B., & Stewart, S. H. (2017). *Drinking to cope with depression mediates the relationship between social anxiety and alcohol-related problems: A 3-wave, 18-month longitudinal study*' which has been accepted at *Addictive Behaviors*. As first author of this manuscript, I assisted in collecting data, as well as conducted the data analyses with co-author K. Thompson, wrote the manuscript, and revised the manuscript in accordance with suggestions from my co-authors and the anonymous peer reviewers.

Introduction

Undergraduates are faced with a plethora of new social situations at university. They may be expected to engage in a wide range of social activities and to form new social relationships. Individuals with high levels of social anxiety may find these new experiences challenging. University also tends to be an environment that is conducive to heavy alcohol consumption; thus, undergraduates with elevated social anxiety may learn to use alcohol as a way of forming new social relationships and alleviating some of the anxiety associated with the new social tasks they are facing (Lewis et al., 2008). This can evolve into problematic drinking patterns, which may persist beyond university (Ham et al., 2009).

Undergraduates high in social anxiety have elevated levels of alcohol-related problems (Lewis et al., 2008; Stewart et al., 2006), despite consuming lesser or equal amounts of alcohol (Buckner et al., 2006; Ham et al., 2007). Theories used to explain the high comorbidity between clinical levels of social anxiety (social anxiety disorder; SAD) and alcohol-use disorders (AUDs; Grant et al., 2005) can be applied to this finding among undergraduates. These theories include tension-reduction (Conger, 1956), stress response dampening (Sher & Levenson, 1982), and self-medication (Khantzian, 1997) theories. A common thread of these theories is the notion that alcohol serves as a mechanism to acutely reduce anxiety levels. This then places individuals at risk for increased alcohol consumption and eventual AUD development (see Morris et al., 2005). The self-medication hypothesis (Khantzian, 1997) differs in that it does not exclusively focus on the anxiolytic effects that alcohol has, and rather posits that alcohol is applied as

a self-medication tool for a wider range of negative affective states (e.g., depression).

The mediating role of drinking motives has been examined in the relationship between social anxiety and alcohol-related problems (Buckner et al., 2006; R. Cooper, et al., 2014; Ham et al., 2007; Lewis et al., 2008; Stewart et al., 2006). Drinking motives are an individual's reasons for consuming alcohol. M. L. Cooper (1994) proposed individuals drink alcohol to achieve a variety of desired outcomes. She suggested two dimensions, valence and source, combine to create four different motives for drinking. Valence refers to the type of reward that is desired by using alcohol (positive or negative reinforcement), whereas source refers to where this desired reward originates (internal or external to the individual). Crossing these dimensions creates four different drinking motives: coping motives (internal motivation to reduce a negative state), conformity motives (external motivation to reduce a negative state), social motives (external motivation to increase a positive state), and enhancement motives (internal motivation to increase a positive state; M. L. Cooper, 1994).

Most research examining the role of drinking motives in explaining the relationship between social anxiety and alcohol-related problems in undergraduates is limited by a cross-sectional design. Stewart and colleagues (2006) used a sample of undergraduate drinkers to examine the cross-sectional mediating role of drinking motives. Social anxiety was negatively associated with frequency of drinking occasions, but positively related to alcohol-related problems. The latter relation was mediated by both coping and conformity drinking motives (Stewart et al., 2006). Lewis and colleagues (2008) replicated these cross-sectional findings in a sample of 316 undergraduates.

Ham and colleagues (2009) found coping motives were a partial mediator of the

link between social anxiety and alcohol-related problems as well as alcohol dependence symptoms in undergraduates cross-sectionally. However, conformity motives were not a mediator in this study (Ham et al., 2009), showing some variability in findings across studies. Villarosa and colleagues (2014) also obtained slightly differing findings from prior studies, finding only conformity motives partially mediated the cross-sectional link between social anxiety and alcohol-related problems, and coping motives were not a significant mediator in this relationship (Villarosa et al., 2014).

In addition to being limited by a cross-sectional design, earlier studies have grouped coping motives into a broad category. However, research illustrates the utility of breaking coping motives into distinct coping with anxiety (CAM) and coping with depression (CDM) motives (Grant et al., 2007). CAM and CDM are associated with different patterns of alcohol use, with CAM being directly related to alcohol-related problems and CDM being indirectly related to alcohol-related problems through higher levels of alcohol consumption (Grant et al., 2007). This highlights the differences between the two coping motives and illustrates the need to examine both motives separately. Buckner and Shah (2015) examined if the differentiation in these two coping motives would shed light on the cross-sectional relationship between social anxiety and alcohol-related problems. They examined CAM and CDM separately, as well as conformity motives, in undergraduate drinkers and found CAM specifically mediated the relationship between social anxiety and alcohol-related problems among women. Among men, conformity motives were a significant mediator. CDM were not found to be a significant mediator of the cross-sectional relationship between social anxiety and alcohol-related problems among either sex (Buckner & Shah, 2015).

A longitudinal design is better suited for assessing temporal and mediational relationships (Cole & Maxwell, 2003). A longitudinal study that investigated the relationship of SAD to drinking motives used adolescents in high school, with follow-ups during emerging adulthood (average age of 23.5 years), and young adulthood (average age of 28.5 years; Windle & Windle, 2012). This study found SAD in adolescence predicted later coping drinking motives, with no relationship between baseline SAD and the development of other drinking motives. This study, however, did not assess the potential mediating role of drinking motives in explaining the link of social anxiety and alcohol-related problems over time and did not separate coping motives into CAM and CDM.

Another longitudinal study tested the mediating role of drinking motives in the relationship of shyness to problematic alcohol use in undergraduates (Young et al., 2016). Shyness is more prevalent than social anxiety and is less severe (Carducci, 1999). This study took place over two years, with each wave spaced six months apart. Shyness was related to less drinking but more alcohol-related problems, similar to research on social anxiety (e.g., Stewart et al., 2006). Results indicated coping, conformity, and enhancement motives mediated the link between shyness and alcohol-related problems over time, with coping motives emerging as the strongest mediator.

Research suggests the relationship between social anxiety and alcohol-related problems is relatively robust, and that drinking motives, particularly negative reinforcement motives, play an important mediating role in this relationship. This study advanced this research by investigating the potential mediating role of drinking motives in explaining the relation of social anxiety to alcohol-related problems using a

longitudinal design and by examining both coping motives (CAM and CDM) separately. To expand on Study 2 of this dissertation, all five drinking motives were examined as potential mediators rather than only focusing on the negative reinforcement drinking motives. Investigating social anxiety using a social avoidance measure also extended prior research. Social avoidance is highly related to social anxiety (Miers et al., 2014), but is associated with higher levels of impairment as it not only includes fear but also avoidance of social situations (Bogels et al., 2010).

It was hypothesized that (a) Wave 1 social avoidance would be unrelated to wave 1 alcohol consumption levels (Buckner et al., 2006; Ham et al., 2007); (b) Wave 1 social avoidance would be positively related to increases in alcohol-related problems over twelve months (wave 1 to 3; Lewis et al., 2008; Stewart et al., 2006); and (c) increases in CAM and conformity motives over six months (waves 1 to 2) would mediate the longitudinal relationship between wave 1 social avoidance and increases in alcohol-related problems over twelve months (waves 1 to 3; Buckner & Shah, 2015; Lewis et al., 2008; Stewart et al., 2006).

Method

Participants

Participants were 219 undergraduates at an eastern Canadian university. Participants were screened for status as a drinker, defined as consuming alcohol at least 4 times in the last month (see Grant et al., 2009). Drinker status was required so that participants could report on their drinking motives. I selected participants who were 26 years of age or younger to ensure generalizability to a typical university population (Buckner & Shah, 2015). This eliminated 15 participants (age range 27-50, $M = 33.06$,

$SD = 8.04$). Of the remaining participants, all ($n = 219$) completed wave one, 184 (84.02%) completed wave two, and 158 completed wave three (72.15%). Participants who did not complete all three waves did not differ from participants who did complete all waves on any variables of interest (age, alcohol consumption levels, M DMQ-R, RAPI, and LSAS-A scores; all p values $> .10$). At wave one⁸, participants' ages ranged from 17- 26 years ($M = 20.59$, $SD = 1.95$), 88.9% identified as Caucasian (other ethnicities included 2.8% Asian Canadian, 1.5% Black Canadian, 1.2% Canadian Aboriginal, 0.8% Hispanic, and 4.8% other), and 72.6% of the sample were female. On average, participants had completed three years of university ($SD = 1.28$) at wave one.

Materials

Social anxiety was measured using the Liebowitz Social Anxiety Scale-Avoidance subscale (LSAS-A; Liebowitz, 1987). The LSAS-A has 24 items that assess social anxiety, with participants rating their levels of avoidance on each item using a 4-point scale from 0 (“*never*”) to 3 (“*usually*”). Social anxiety in this study will be referred to as social avoidance to reflect the way social anxiety was assessed. The LSAS-A demonstrated strong internal consistency in this study with Cronbach’s alphas ranging from .93 to .94 across waves.

Drinking motives were measured with the Modified Drinking Motives

⁸This is the same sample of participants from Study 2a ($n = 263$). However, the current study used Waves 2 to 4 (referred to in this study as Waves 1 to 3) of a four-wave longitudinal study. Study 2a used data from the first wave to ensure the data for both studies were distinct from one another. Study 2a data was collected in the laboratory whereas all data from the current study was collected online. No data from Study 2a is used in the current analyses.

Questionnaire-Revised (M DMQ-R; Grant et al., 2007). This is a 28-item self-report questionnaire that yields scores on five subscales each representing a distinct motive for alcohol consumption: social, conformity, enhancement, CAM, and CDM. Participants rate how often they consume alcohol for each specific reason on a scale of 1 (“*almost never/never*”) to 5 (“*almost always/always*”). The Cronbach’s alpha reliabilities for this study ranged from .72 to .94 for the various motives across waves.

Alcohol-related problems were measured with the Rutgers Alcohol Problem Index (RAPI; White & Labouvie, 1989). This questionnaire has 23 items that assess problems related to alcohol consumption (e.g., “Went to work or school high or drunk”). This measure is designed with alcohol-related problems most common for young people in mind. Responses are scored from 0 (“*never*”) to 4 (“*more than 8 times*”). Cronbach’s alpha reliabilities for the RAPI were high (.92 to .94) across waves in the current sample.

Drinking quantity (how much alcohol one consumes during a typical drinking episode over the past thirty days) was measured using a single item measure embedded in a demographics and lifestyle questionnaire which also assessed behaviours such as exercise, smoking, and caffeine intake to reduce salience of the drinking item (Grant & Stewart, 2007). Research shows self-report measures of alcohol consumption are valid when embedded among other questions, when questions are open-ended, and when confidentiality is assured (Sobell & Sobell, 1990), as in this study.

Procedure

The Health Sciences Research Ethics Board at the university where the study was conducted approved this study. Participants were recruited through the Psychology Department participant pool via an online database. After providing written informed

consent, participants completed four waves of data collection spaced six months apart over an eighteen month period (with the average length of time between each wave ranging from 177 to 196 days). Measures included, but were not limited to, those mentioned above and were identical across waves. For the in-person baseline, participants were invited to the lab to provide informed consent and complete an information form allowing me to contact them at six, twelve, and eighteen months (i.e., waves one, two, and three in the current study). Participants were instructed to complete follow-up waves at home via online questionnaires, with links sent via email. All data in the current study was collected via online questionnaires that participants completed at home. If a participant skipped a wave, they were still invited to complete the following waves of data collection. Upon study completion, participants were invited to the lab for debriefing and compensation.

Plan of Analysis

Path analysis was used to assess whether drinking motives (wave 2) mediated the association between social avoidance (wave 1) and alcohol problems (wave 3) across twelve months. Models were fit using Mplus 8 (Muthen & Muthen, 2012). Missing data was handled using full-information maximum likelihood (FIML), which uses all available information under the assumption that data are missing at random. The MLR estimator, which provides maximum likelihood parameter estimates, was used to adjust for non-normality of the data (Little & Rubin, 2014; Muthen & Muthen, 2012). Analyses controlled for baseline (wave 1) levels of drinking motives, alcohol problems, age, gender, and drinking quantity and correlations between mediating variables were specified. Indirect effects were estimated in MPlus using the INDIRECT command,

which uses Sobel (1982) standard errors. One thousand bootstrapped samples and bias-corrected 95% confidence intervals were used to determine the significance of the hypothesized indirect effects consistent with MacKinnon and colleagues' (2002) recommendations. Model fit was assessed using incremental fit indices and chi-square. A $RMSEA \leq .05$ and $CFI \geq .95$ were used to indicate good/very good model fit and a $RMSEA \leq .08$ and $CFI \geq .90$ indicated adequate fit (Little, 2013).

Results

Correlations were calculated for all variables of interest (see Table 3.1).

Accounting for baseline levels of the mediators and alcohol problems, the hypothesized model had a good fit to the data, $\chi^2(31) = 60.75$, $p = .001$, $RMSEA = .07$, $CFI = .95$ (Figure 3.1). Social avoidance at wave 1 was associated with significant increases in each of the drinking motives at wave 2. Social avoidance at wave 1 was not directly associated with increases in alcohol problems at wave 3. Rather, there was a significant indirect effect of social avoidance on alcohol problems through coping with depression motives (CDM) at wave 2 (indirect effect = 0.15; 95% bootstrapped CI's = 0.02 – 0.33). Thus, social avoidance predicted increases in coping with depression drinking motives six months later, which in turn predicted increases in alcohol-related problems at twelve months. Contrary to hypotheses, conformity motives and coping with anxiety motives (CAM) at wave 2 were not associated with increases in alcohol-related problems at wave 3 and did not significantly mediate the association between social avoidance and alcohol problems over time (CAM: indirect effect = -0.007, 95% CI = -0.07 – 0.06; Conformity: indirect effect = 0.03, 95% CI = -0.03 – 0.09). Social motives and enhancement motives were also unrelated to alcohol-related problems in the current

study and did not mediate the association between social avoidance and alcohol problems across time (Social: indirect effect = 0.012, 95% CI = -0.01 – 0.04; Enhancement: indirect effect = 0.02, 95% CI = -0.01 – 0.06). Overall, the model accounted for 59% of the variance in alcohol-related problems.

Discussion

My findings indicate that undergraduates high in social avoidance experience elevated levels of alcohol-related problems due to using alcohol to cope with depressed mood. These findings differ from past research that found it was coping with an anxious mood that mediated this relationship (Buckner & Shah, 2015). These results fit with the self-medication hypothesis (Khantzian, 1997), which posits certain people are vulnerable to developing alcohol-related problems due to using alcohol to self-medicate, in this case with depressed mood.

This is the first longitudinal study of the mediating role of drinking motives in explaining the link between social avoidance and increases in alcohol-related problems over time in undergraduates. This study extended Study 2 of this dissertation by using a longitudinal design and by examining the role of all five drinking motives. While prior research has primarily examined the role of negative reinforcement motives (Ham et al., 2009; Lewis et al., 2008; Stewart et al., 2006; Villarosa et al., 2014), I included all motives in this study to ensure that social and/or enhancement motives were not also mediating this relationship. My study extended longitudinal research examining social anxiety and drinking motives in high school students (Windle & Windle, 2012) in two ways: (a) by providing clarification regarding which motives increase over time among socially avoidant individuals and (b) by demonstrating that coping motives mediate the

link between social avoidance and alcohol-related problems over time. Another longitudinal study (Young et al., 2016) examined shyness (not social anxiety). My results and Young et al.'s (2016) results suggest coping motives are important in explaining the link between individual differences in social anxiety and alcohol-related problems.

This study found social avoidance was not correlated with alcohol consumption, replicating past research (Ham et al., 2007; Lewis et al., 2008; Stewart et al., 2006). I found social avoidance predicted increases in all five drinking motives over twelve months, but with only CDM linked to increases in alcohol-related problems over time. This observation suggests that socially avoidant undergraduates tend to be motivated to increasingly use alcohol for all negative reinforcement motives over time, consistent with predictions of the tension-reduction theory (Conger, 1956) and the self-medication model (Khantzian, 1997), as well as for positive reinforcement motives over time. However, it is specifically their escalations in CDM that cause increasing alcohol-related problems over time, which is only consistent with the self-medication model (Khantzian, 1997).

An explanation for the observed mediating role of CDM in this study may pertain to my focus on social avoidance as the social anxiety construct of interest, since social avoidance is correlated with depression (Dalbudak et al., 2013). In a prior study with university students, after controlling for anxiety, harm avoidance, self-directedness, and alexithymia symptoms, the LSAS–avoidance subscale (Liebowitz, 1987) was related to depression whereas the LSAS–fear subscale (Liebowitz, 1987) was not (Dalbudak et al., 2013). My study used a social avoidance measure as this construct is related to higher levels of functional impairment as compared to social fears, as socially avoidant individuals not only experience distress due to high levels of social anxiety but also avoid

social situations (Bogels et al., 2010). Perhaps the isolation linked to social avoidance leads to depression and thus socially avoidant individuals drink to manage the associated dysphoria. The mechanisms underlying the link of social avoidance with CDM drinking is deserving of additional research.

Examining the drinking context in which these individuals consume alcohol is an important next step. It may be that socially avoidant individuals who are primarily CDM drinkers drink more often in solitary contexts (e.g., home alone), whereas shy individuals who are primarily CAM or conformity motivated drinkers may drink more often in social situations such as at parties or bars.

Limitations and Future Research

The current study relied on undergraduates and so may not be generalizable to clinical samples of individuals with social anxiety and/or an AUD. Future research should examine reasons why students do not drink alcohol (Gadon, Bruce, McConnochie, & Jones, 2004), in addition to reasons for drinking alcohol, as this may also better explain the drinking patterns of socially anxious individuals. Perhaps they are worried about the disinhibiting effects of alcohol or are avoiding social situations (e.g., parties) where alcohol use is more common (Ham et al., 2007). This may provide information regarding social avoidance as a protective factor against alcohol-related problems.

Implications

My study underlined the explanatory role of CDM in the relation of social avoidance to alcohol-related problems. As prior cross-sectional research had found CAM to mediate this relationship (Buckner & Shah, 2015), it may be that socially avoidant students initially drink to cope with anxiety but that over time, and with increased social

avoidance, they may turn to drinking to cope with the depression associated with their social isolation. Drinking to cope with depression involves consuming alcohol to reduce or control depressed mood, and so it may be important for socially avoidant individuals to not only focus on reducing social avoidance but also on better managing the resulting depression. This may be beneficial in preventing socially avoidant undergraduates from experiencing elevated levels of alcohol-related problems.

Concluding Remarks

I found social avoidance predicted increases in all five drinking motives (CAM, CDM, conformity, social, and enhancement) over six months, but only CDM was linked to increases in alcohol-related problems over time. Consequently, socially avoidant undergraduates are motivated to drink for a wide range of reasons (to fit in, to cope with anxiety, to cope with depression, to socialize, and to feel the “buzz” or high of alcohol) but only drinking to cope with depression is contributing to their increased alcohol-related problems over time.

Table 3.1. Correlations, Means, and Standard Deviations for Drinking Quantity, Drinking Motives, Alcohol Problems, and Social Avoidance Across 18 Months

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1. Drinking quantity (w1)	-																								
2. SM (w1)	.19**	-																							
3. EM (w1)	.35**	.61**	-																						
4. Conf. (w1)	.00	.29**	.20**	-																					
5. CAM (w1)	.12	.44**	.50**	.41**	-																				
6. CDM (w1)	.01	.22**	.32**	.43**	.62**	-																			
7. RAPI (w1)	.29**	.17*	.36**	.22**	.42**	.36**	-																		
8. LSAS-A (w1)	-.01	.12	.06	.21**	.24**	.23**	.20**	-																	
9. Drinking quantity (w2)	.68**	.21**	.34**	.05	.16*	.06	.45**	.04	-																
10. SM (w2)	.01	.61**	.34**	.30**	.27**	.12	.16*	.22**	.22**	-															
11. EM (w2)	.22**	.47**	.66**	.09	.35**	.22**	.33**	.21**	.41**	.52**	-														
12. Conf. (w2)	-.03	.23**	.15	.62**	.37**	.43**	.23**	.35**	.10	.34**	.23**	-													
13. CAM (w2)	.04	.40**	.39**	.34**	.68**	.58**	.44**	.37**	.15*	.40**	.52**	.47**	-												
14. CDM (w2)	-.03	.16*	.17	.32**	.47**	.73**	.44**	.35**	.08	.17*	.32**	.42**	.71**	-											
15. RAPI (w2)	.28**	.29**	.38**	.10	.34**	.35**	.74**	.25**	.40**	.26**	.44**	.21**	.49**	.51**	-										
16. LSAS-A (w2)	-.06	.18*	.07	.15	.12	.25**	.10	.72**	-.02	.15	.19*	.33**	.33**	.38**	.28**	-									

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
17. Drinking quantity (w3)	.60**	.21**	.28**	.00	.02	-.09	.28**	-.01	.70**	.34**	.37**	-.04	.11	.05	.34**	.07	-							
18. SM (w3)	.03	.55**	.41**	.18*	.23**	.09	.13	.09	.20*	.73**	.44**	.17*	.31**	.20*	.24**	.10	.32**	-						
19. EM (w3)	.27**	.33**	.63**	.00	.29**	.22**	.28**	.25**	.40**	.39**	.73**	.14	.44**	.29**	.43**	.29**	.41**	.54**	-					
20. Conf. (w3)	.10	.22**	.11	.54**	.25**	.32**	.16*	.24**	.12	.20*	-.03	.70**	.26**	.26**	.07	.34**	.04	.14	.13	-				
21. CAM (w3)	.03	.23**	.28**	.18*	.59**	.43**	.29**	.35**	.11	.27**	.39**	.29**	.75**	.62**	.38**	.33**	.06	.38**	.51**	.29**	-			
22. CDM (w3)	.00	.12	.10	.20*	.43**	.66**	.15	.41**	.02	.10	.21**	.28**	.52**	.80**	.32**	.39**	.01	.16*	.35**	.35**	.68**	-		
23. RAPI (w3)	.26**	.20*	.25**	.02	.28**	.27**	.57**	.32**	.47**	.28**	.42**	.20*	.50**	.54**	.83**	.32**	.38**	.29**	.50**	.17*	.42**	.40**	-	
24. LSAS-A (w3)	.02	.14	.05	.17*	.22**	.27**	.16	.66**	.04	.13	.12	.37**	.23**	.20*	.16	.75**	.06	.08	.22**	.45**	.35**	.38**	.25**	-
Mean	4.9	3.0	2.7	1.3	1.9	1.4	9.3	11.9	5.3	3.0	2.6	1.3	1.9	1.4	8.8	11.4	4.5	3.0	2.7	1.2	1.9	1.4	7.7	11.0
SD	2.67	.87	.97	.47	.80	.62	10.90	11.38	3.20	.86	.98	.55	.81	.62	11.50	11.43	2.42	.82	.94	.41	.81	.67	8.98	11.33

Note. SM = Social Motives; EM = Enhancement Motives; Conf. = Conformity Motives; CAM = Coping with Anxiety Motives; CDM = Coping with Depression Motives; RAPI = Rutgers Alcohol Problem Index, a measure of alcohol-related problems; LSAS-A = Liebowitz Social Anxiety Scale-Avoidance subscale, a measure of social avoidance. * $p < .05$; ** $p < .01$

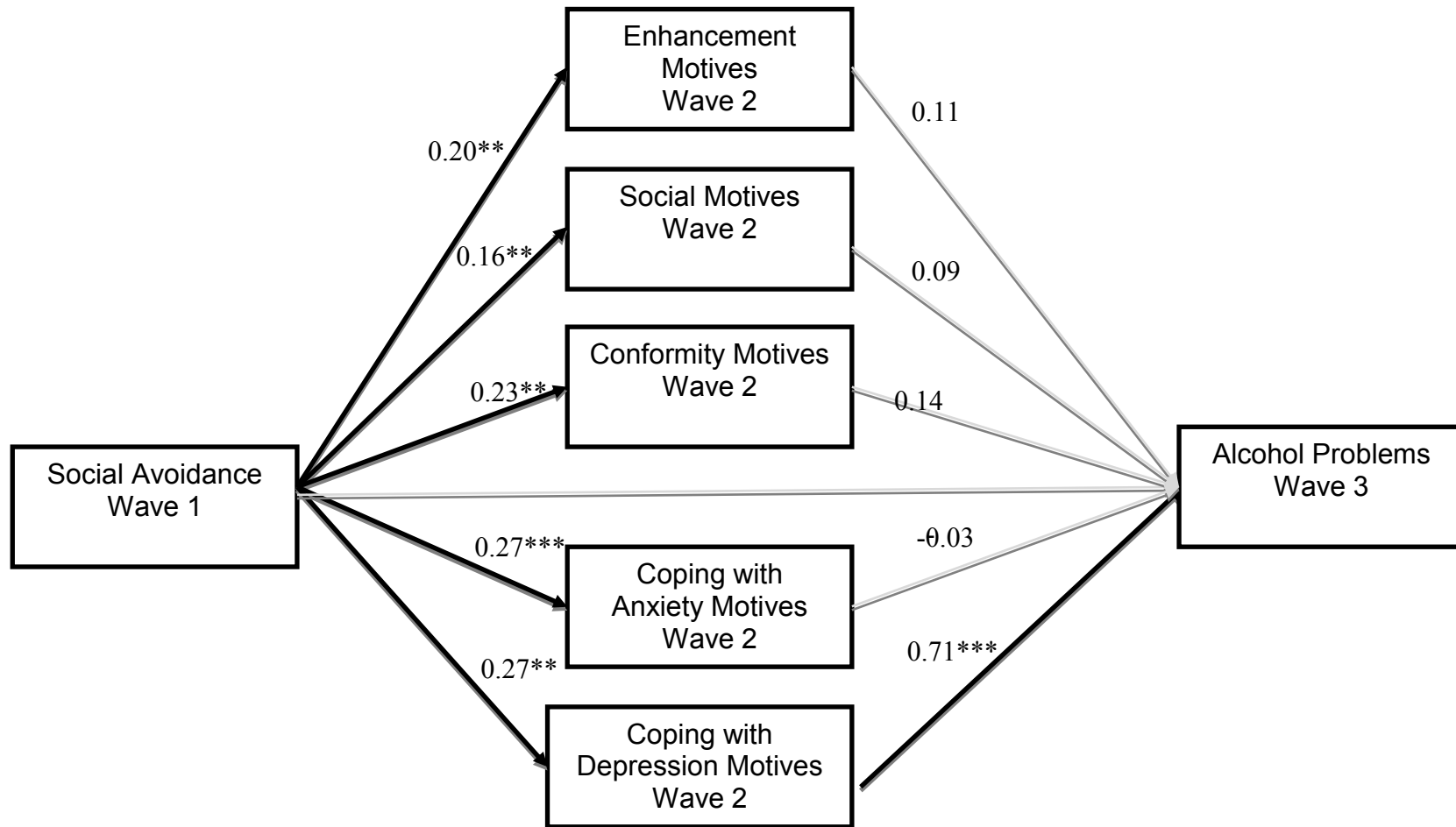


Figure 3.1. Longitudinal associations between social avoidance (wave 1), drinking motives (wave 2) and alcohol problems (wave 3). Model controls for baseline levels (wave 1) of drinking motives and alcohol problems, as well as age, gender, and alcohol use. Correlations between mediators were specified. Standardized estimates are shown. Non-significant paths are grey. Model fit: $\chi^2(31) = 60.75$, $p = 0.001$, RMSEA = 0.07, CFI = .95. *** $p < .001$, ** $p < .01$.

CHAPTER 7. GENERAL DISCUSSION

The findings from these four dissertation studies shed new light on how coping motives impact alcohol-related behaviours and outcomes among university students. While it was originally hypothesized in Study 1 that inducing an anxious mood would lead to increased alcohol consumption among coping with anxiety motivated (CAM) individuals, this prediction was not borne out by the data. Unexpectedly, I also observed that inducing a positive mood led to increased alcohol consumption among socially motivated (SM) drinkers. In Study 2a&b, I found that coping with depression motives (CDM) and coping with social anxiety motives (CSAM) mediated the cross-sectional relationship between social avoidance and alcohol-related problems among university students. Unexpectedly, CAM was not noted to be a significant mediator in this relationship. Similarly, drinking context was not found to be a significant mediator, although I did find that both coping motives (i.e., CSAM and CDM) predicted increased alcohol consumption in both risky drinking contexts. Finally, it was revealed that in addition to CDM mediating the relationship between social avoidance and alcohol-related problems cross-sectionally (Study 2a), this same motive mediated longitudinally as well (Study 3). Again, CAM were not found to be a significant mediator of the social anxiety – alcohol-related problems relationship when examined prospectively. The remaining drinking motives (conformity, social, and enhancement motives) were also ruled out as potential mediators in this relationship. Explanations and implications for these results will follow.

Looking first at the impact of inducing a positive mood on SM drinkers, I originally hypothesized that the mood manipulation would not have a significant effect on alcohol consumption among these individuals as SM are an externally-driven motive

(Cooper et al., 1992; Cooper, 1994) and mood is an internal variable. A potential explanation for why SM drinkers consumed more alcohol when a positive mood was induced is that SM drinkers tend to consume alcohol in positive, convivial environments (Cooper et al., 1992; Cooper, 1994), and so it may be that a positive mood is a trigger for these individuals, as they have learned to associate alcohol consumption behavior with the antecedent of feeling positive.

Another potential explanation may involve the close relationship that SM have with enhancement motives (EM). Prior research has shown that SM and EM are the most correlated of all the motives (Grant et al., 2007), indicating that there may be some overlap between the positively reinforcing internal motive (EM) and the positively reinforcing external motive (SM). Some studies have even created a social-enhancement composite score (Armeli et al., 2008) due to this high overlap between the two motives. EM drinkers have been found to consume higher levels of alcohol consumption when a positive mood is induced (Birch et al., 2006b), and so it is possible that the current SM drinkers were consuming higher levels of alcohol consumption due to their tendencies to consume alcohol for EM reasons as well as SM reasons.

Finally, it may be that SM drinkers were not actually increasing their alcohol consumption in response to a positive mood but rather were inhibiting their alcohol consumption in response to a negative mood. Daily diary research has shown that SM drinkers showed a normative pattern of inhibiting alcohol consumption when experiencing anxiety (Grant et al., 2009). A limitation of Study 1 in this dissertation was the absence of a neutral mood condition, making it difficult to determine whether SM drinkers consumed more in response to a positive mood or consumed less in response to

an anxious mood. This question requires additional research.

An anxious mood did not appear to be a trigger for consuming alcohol for CAM drinkers in the current study. Prior researchers that investigated alcohol outcome expectancies in coping motivated drinkers hypothesized that when a negative mood was induced, these individuals would be faster to associate relief expectancies with alcohol (Birch et al., 2008). However, the authors did not find support for this hypothesis. They found that all experimental groups (coping motivated drinkers and enhancement motivated drinkers in either a positive or negative mood group) had stronger reward-alcohol outcome expectancies than relief-alcohol associations. They suggested that reward expectancies are more normative among young undergraduate student drinkers (Birch et al., 2008). While the current study did not examine automatic alcohol outcome expectancies, there still may have been some concern among CAM participants regarding how their coping-related alcohol consumption would be perceived. This explanation may be a potential reason for why CAM drinkers in the current study did not consume more alcohol in the lab when a negative mood, compared to a positive mood, was induced. Prior research has also found that alcohol outcome expectancies regarding the negative impact of alcohol on cognition can lead to decreased alcohol consumption, even among those who are coping motivated (Cludius et al., 2013). Perhaps the CAM drinkers in Study 1 were concerned about their performance during the taste-rating portion of the experiment, and therefore did not want to drink excessively. As Study 1 did not assess for alcohol outcome expectancies, it is unclear if these had an impact on the results.

Given that coping motivated drinkers often consume alcohol at home or alone (Cooper et al., 1992; Cooper, 1994), the fact that testing was conducted in a lab

environment that was intended to mimic a bar environment rather than a home environment may have impacted the Study 1 results for CAM drinkers. One prior study found that negative mood drinking and negative-event drinking relationships were stronger among individuals who were high in coping motives, but only for drinking at home. This relationship did not generalize to other contexts (Mohr et al., 2005). The bar lab environment where the current study took place may not have been particularly conducive to increased alcohol consumption among CAM drinkers due to its failure to match their typical drinking contexts (Cooper et al., 1992; Cooper, 1994).

Other researchers have found that while daytime negative mood led to higher endorsement of coping motives, this did not translate into greater alcohol consumption (Dvorak, Pearson, & Day, 2014). Given that the dependent variable in Study 1 was alcohol consumption levels, rather than alcohol outcome expectancies, drinking motive endorsement level, or alcohol-related problems, this may have made it difficult to examine the impact of anxious mood on CAM drinkers. Perhaps alcohol consumption levels were not the most appropriate dependent variable for these individuals.

In a daily diary study, Grant and colleagues (2009) found that students who were low on CAM showed a negative correlation between daytime anxiety and alcohol consumption, meaning that on days with increased anxiety, these students consumed less alcohol. Students with higher CAM scores were not found to exhibit this same inhibiting effect and still consumed high levels of alcohol when experiencing anxiety (Grant et al., 2009). The CAM student drinkers in Study 1 may not have consumed higher levels of alcohol when an anxious (versus positive) mood was induced, but they also did not inhibit their alcohol consumption in the way that SM drinkers did in the anxious mood

condition, which fits with Grant and colleagues' (2009) daily diary findings. Again, the absence of a neutral mood condition makes this difficult to determine with certainty. However, the current results combined with prior research suggest that CAM drinkers do not consume more alcohol in response to anxious moods but rather do not show the normative, and protective, response of inhibiting their alcohol consumption when anxious.

Finally, it may be that I induced the incorrect form of anxiety in the CAM drinkers in Study 1. Anxiety can take a wide range of presentations, with generalized anxiety, panic anxiety, and social anxiety all presenting somewhat differently (Barlow, Durand, & Stewart, 2009). For example, if the CAM drinkers in Study 1 typically drink to cope with social anxiety specifically, then sitting alone in a lab as they were in the Study 1, while increasing general anxiety levels, would not have been motivationally significant in prompting drinking behaviour.

This led me to my next set of questions regarding coping drinking motives among individuals with social anxiety specifically. I was interested in why socially anxious students have such high levels of alcohol-related problems relative to other students despite consuming equivalent or lower levels of alcohol. Again, drinking motives appeared to play an important role, with prior cross-sectional research implicating coping and conformity motives as mediating the relationship between social anxiety and alcohol-related problems. I extended this prior research by assessing distinct coping motives separately (CAM and CDM in Study2a and CAM, CDM, and CSAM in Study2b) as well as by employing a social avoidance measure as my social anxiety index of interest. Social avoidance was chosen as it is a more severe variant of social anxiety, with socially

avoidant individuals not only experiencing elevated anxiety in social situations but also avoiding these situations due to their high levels of anxiety (Harvey, Watkins, Mansell, & Shafran, 2004). Prior research with emerging adults has found that social competence and social support seeking are negatively associated with solitary drinking (an indicator of problem drinking) and that social withdrawal is positively associated with solitary drinking (Gonzalez, Reynolds, & Skewes, 2011). Cross-sectional research has also shown that social anxiety in emerging adults is associated with problem drinking due to increased solitary predrinking (i.e., drinking alone before a social event; Keough et al., 2016). As social avoidance is linked with social isolation (Teo, Lerrigo, & Rogers, 2013), it may have an even stronger relationship with alcohol-related problems than social fear per se due to consuming alcohol primarily when alone.

It has also been found that social avoidance as measured by the Liebowitz Social Anxiety Scale-Avoidance Subscale (LSAS-A; Liebowitz, 1987) is linked to depression whereas social fear alone is not (Dalbudak et al., 2013). My use of a social avoidance measure, and its relationship with depression, may explain why CDM emerged as the primary mediator in the relationship between social avoidance and alcohol-related problems in Study 2a. Socially avoidant students are not only experiencing anxiety regarding social situations, and avoiding these situations, but they are also experiencing higher levels of depression (Dalbudak et al., 2013) and appear to be drinking to cope with this negative emotion specifically. The lack of mediation by CAM in Study 2a was somewhat surprising, however. It may be that socially fearful individuals are experiencing alcohol-related problems due to CAM as they are still presenting at social events and are drinking to cope with the corresponding anxiety which in turn may lead to

alcohol-related problems (e.g., embarrassing yourself at a party, having unprotected sexual relations). Prior research has revealed the mediating role of CAM in the relation of social anxiety and alcohol-related problems among women (Buckner & Shah, 2015). However, with socially avoidant individuals, it is less likely that they would present to these social events. Instead, socially avoidant individuals may be more likely to be at home alone drinking to cope with the corresponding depression rather than the original anxiety that prompted them to stay home. The lack of social constraints available when drinking alone may then lead to alcohol-related problems (e.g., drinking to the point of sickness or blacking out). However, a limitation of the current dissertation is that social fear, measured with the LSAS- Fear Subscale (LSAS-F; Liebowitz, 1987), was not controlled for in statistical analyses. Heimberg and colleagues (1999) noted that the LSAS-A and LSAS-F subscales are highly correlated in clinical samples, and cautioned against interpreting these subscales separately, as was done in the current dissertation with non-clinical university students.

In Study 2b, I found that CSAM, as well as CDM, mediated the cross-sectional relationship between social avoidance and alcohol-related problems. These findings regarding CSAM fit with prior research that has found that this motive is the primary factor in explaining problematic alcohol use in individuals with social anxiety (Cludius et al., 2013). The university environment is one in which alcohol consumption is a normative behaviour, and so socially anxious individuals are able to drink to cope with their social anxiety without having to worry about being judged negatively for it (Windle & Windle, 2012). However, becoming reliant on this coping mechanism may lead to increased alcohol-related problems, as seen in Study 2b, and these problems may persist

beyond the university years (Ham et al., 2009).

While the current dissertation investigated university students, among clinical populations it has been hypothesized that the high rates of comorbidity between SAD and alcohol use disorders (AUD) may be due to another common comorbidity – that between social anxiety and mood disorders (Buckner et al., 2008a). In one study that investigated CSAM in male AUD inpatients, it was found that individuals with both AUD and SAD (compared to individuals who only presented with an AUD) had higher levels of depression (Cooper et al., 2014). It has also been found that individuals with an AUD and a lifetime history of SAD (compared to individuals who have never had SAD) had less social support, more severe alcohol dependence, and more co-occurring mood disorders (Buckner & Heimberg, 2010), highlighting the overlap between social anxiety and depression among problematic drinkers. These prior findings help shed light on why both CSAM and CDM proved significant and independent mediators of the social avoidance – alcohol-related problems relationship in Study 2b.

The stress response dampening model (Sher & Levenson, 1982), tension reduction theory (Conger, 1956), and self-medication hypothesis (Khantzian, 1997) all posit that individuals learn to use alcohol as a means of reducing negative affect, specifically anxiety for two of the models (the stress response dampening model and tension reduction theory). However, the third model (the self-medication model; Khantzian, 1997) does not specify that the affect motivating alcohol use must be anxiety; thus, the self-medication model can be applied to understanding how a wider range of negative affective states, including both social anxiety and sadness, can trigger alcohol use. The current research provides evidence in favour of the self-medication model

(Khantzian, 1997) as socially avoidant individuals consume alcohol to cope with depression as well as social anxiety.

In addition to mediating the relationship between social avoidance and alcohol-related problems, I also found that CSAM and CDM led to increased alcohol consumption levels in a couple of specific risky drinking contexts. However, these drinking contexts themselves generally did not lead to alcohol-related problems once drinking motives were assessed. This fits with Cooper's model (Cooper, 1994; Cooper et al., 1992; 2015), which states that drinking motives are a final common pathway to alcohol-related problems through which other variables exert their effects. Prior research that has found that heavy drinking in certain drinking contexts lead to alcohol-related problems were likely actually picking up the drinking motives that are present in these contexts. One such study found that elevated social anxiety was related to increased alcohol consumption in negative emotional and personal/intimate contexts, but not social/convivial contexts, and the increased quantity of alcohol consumed in these risky contexts mediated the relationship between social anxiety and alcohol-related problems (Terlecki et al., 2014). Other research has also found that coping and conformity motives predicted heavier drinking in certain risky contexts (negative emotional and personal/intimate contexts), but not in social situations (Terlecki & Buckner, 2015). This fits with the findings of my Study 2b as I also found that coping motives predicted greater drinking in these same two risky contexts. It appears that that coping motives, specifically CDM and CSAM, lead to increased drinking in these risky contexts among socially anxious individuals and that the motives themselves lead to the alcohol-related problems rather than the drinking context per se.

My two cross-sectional studies of mediation (Studies 2a and 2b) were performed to extend prior cross-sectional research by examining all three coping motives simultaneously and by extending to social avoidance. A study by Maxwell and Cole (2007) illustrated that cross-sectional examinations of mediation are very common. Their literature review of mediation studies in popular research journals revealed that only one out of 68 articles (containing 72 studies) had a full longitudinal design (i.e., measured all variables at different time points) that also controlled for prior levels of outcome and mediational variables. However, mediation implies change over time. These authors illuminated that cross-sectional examinations of mediation are inherently biased (Maxwell & Cole, 2007). They showed that cross-sectional estimates of mediation typically over- or under-estimated the true mediation effect, and that it was not always clear which direction the bias was in, highlighting the need for longitudinal mediation studies (Maxwell & Cole, 2007).

After extending the prior cross-sectional mediational research in Studies 2a and 2b, I then utilized a longitudinal design to assess for mediation and to determine whether the prior cross-sectional results in Study 2a were accurately capturing the mediation that is occurring. In the current dissertation, both the cross-sectional and the longitudinal mediation studies consistently revealed that CDM mediated the relationship between social avoidance and alcohol-related problems. This means that this somewhat unexpected finding was not the result of a biased model in the cross-sectional studies. Study 2a and Study 2b suggest that CDM help explain why social avoidance and alcohol-related problems are concurrently related, Study 3 shows that socially avoidant students escalate their alcohol-related problems over time at least in part because they escalate

alcohol consumption to cope with depression.

Implications

The results from my set of dissertation studies have a number of potential practical implications. First, Study 1 revealed the importance of teaching CAM drinkers to decrease their alcohol consumption when experiencing elevated levels of anxiety. Learning better coping strategies to manage anxiety and to inhibit alcohol consumption when feeling anxious, as SM drinkers do, will serve to reduce the risk of problematic alcohol consumption during anxious times. Studies 2 and 3 indicate that not only is it important to teach socially avoidant students how to better manage their social anxiety, but also to help manage depressive symptoms. Socially avoidant students consume alcohol more than others for a number of negatively reinforcing reasons, but it is only CDM and CSAM that lead to their greater levels of alcohol-related problems. Learning better mood management techniques could be beneficial in reducing coping motivated alcohol consumption, and it could also reduce the amount of alcohol they consume in risky negatively reinforcing drinking contexts (i.e., those involving negative mood states and personal/intimate contexts).

In general, university students perceive other university students as consuming higher amounts of alcohol than is actually the case (Lewis et al., 2008). Socially anxious students are more likely to drink at these perceived rates (Lewis et al., 2008), and to believe that other individuals will not judge them negatively if their alcohol use becomes problematic (Buckner, Ecker, & Proctor, 2011). Providing accurate information regarding actual alcohol consumption levels among typical university students may also be beneficial in reducing the number of alcohol-related problems that socially anxious

students experience. One such program, the Brief Alcohol Screening and Intervention for College Students (BASICS), which utilizes normative feedback for alcohol consumption levels, appears to be less effective for socially anxious students than other students (Terlecki, Buckner, Larimer, & Copeland, 2012). The authors hypothesized that this observation was due to socially anxious students' fear of negative evaluation if they deviated from perceived drinking norms (Terlecki et al., 2012). Consequently, in order for interventions aimed at reducing alcohol-related problems among socially anxious students to be effective, there needs to be a change in the students' normative beliefs about drinking as well as beliefs about other individuals' approval of risky drinking (i.e., injunctive norms; Terlecki et al., 2012). Using interventions that target social anxiety and depressive symptoms may be an important first step prior to utilizing normative feedback among this population. By reducing the negative affective symptoms for which they are drinking to cope may be beneficial in reducing alcohol-related problems while also allowing this population to be more receptive to normative feedback, thereby potentially reducing alcohol-related problems.

An RCT with female university students high in anxiety sensitivity (AS), which is anxiety regarding anxiety symptoms, found that by targeting the AS symptoms specifically, alcohol-related problems and emotional relief alcohol outcome expectancies were significantly reduced (Watt, Stewart, Birch, & Bernier, 2006). The current dissertation research indicates that it may be important to target depressive symptoms as well as social anxiety symptoms in alcohol interventions designed for socially avoidant university students. By helping socially avoidant students learn to better manage both social anxiety and depression may lead to a reduction in their CSAM and CDM, which

may in turn reduce their risk for heavy drinking in negatively reinforcing contexts as well as alcohol-related problems.

Future Directions

Future research should investigate the role of CSAM longitudinally, as the current dissertation was limited in that it only investigated this motive in a cross-sectional design. Given that CSAM was found to predict increased drinking in both risky contexts, it may be playing an important role over time. A longitudinal study that examined a range of ages would also be helpful to determine if the findings are generalizable beyond university. Do the alcohol-related problems experienced by those with social avoidance persist beyond the university years? Prior research with social anxiety suggests that their heightened risk extends beyond the university years (Ham et al., 2009), but more research is needed to determine if there are moderating factors that reduce or increase this risk and whether these findings extend to social avoidance. An examination of reasons why students do not drink alcohol (see Gadon et al., 2004), in addition to reasons for drinking alcohol, may also better explain the drinking patterns of socially anxious individuals. Perhaps they are worried about the disinhibiting effects of alcohol or are avoiding social situations (such as parties) where alcohol use is more common (Ham et al., 2007). Such research could help determine when social avoidance is risky vs. protective for the development of alcohol-related problems. Further exploring the role of mood in impacting alcohol consumption in CAM drinkers is also important: investigating how different types of anxiety as well as how different contexts impact alcohol behaviours and outcomes among all types of coping motivated drinkers will provide important information to better understand and treat problematic coping motivated university

student drinkers. Such research could utilize both lab-based methods, such as the taste-rating task used in Study 1 of this dissertation, as well as daily diary methods. Both methods have their own unique advantages and disadvantages. The taste-rating task allows for experimental control and determination of causality, however it has been criticized for its relative artificiality. Daily diary methods have greater ecological validity and can identify temporality, however are subject to limitations regarding causality.

Conclusion

Overall, my dissertation revealed that CAM drinkers are perhaps not increasing their alcohol consumption when an anxious mood is induced, but they are also not inhibiting their drinking in the normative and relatively safe way that SM drinkers are. Helping CAM drinkers to notice and inhibit their alcohol consumption when experiencing negative affect may be beneficial in reducing their increased risk for alcohol-related problems. This dissertation also revealed that while CDM and CSAM predicted heavier alcohol consumption in certain risky contexts (negative emotional for CDM and negative emotional and personal/intimate for CSAM), it is the drinking motive itself that is leading to increased alcohol-related problems among socially avoidant university students. When assessed longitudinally, it was found that increases in CDM drinking explained increases in alcohol-related problems among socially avoidant individuals over time. Interventions for socially avoidant individuals with (or at risk for) alcohol-related problems should also focus on mood management techniques for depressed affect rather than focusing exclusively on their social anxiety symptoms.

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APPENDIX A: DEMOGRAPHIC QUESTIONNAIRE

(Used in Study 1, Study 2a, Study 2b, and Study 3)

1. What is your current level in school?
 - a. First year
 - b. Second year
 - c. Third year
 - d. Fourth year
 - e. Fifth year or beyond
2. How old are you?
 - a. 19 years old
 - b. 20 years old
 - c. 21 years old
 - d. 22 years old
 - e. 23 years old
 - f. 24 years old
 - g. 25 years old
3. What is your sex?
 - a. Male
 - b. Female
 - c. Other
4. Please specify the ethnicity with which you most strongly identify
 - a. Hispanic, Latino
 - b. Black (non-Hispanic)
 - c. Native Canadian
 - d. White
 - e. Asian
 - f. Other. Please specify: _____
5. What is the annual salary of your family of origin?
 - a. Up to \$10 999
 - b. \$11 000 to \$20 999
 - c. \$21 000 to \$30 999
 - d. \$31 000 to \$40 999
 - e. \$41 000 to \$50 999
 - f. \$51 000 to \$60 999
 - g. \$61 000 to \$70 999
 - h. \$71 000 to \$80 999
 - i. More than \$80 999
6. Do you have a job outside of school?
 - a. No
 - b. Yes, part time (on average, 9 hours or less per week)
 - c. Yes, part time (on average, between 10-19 hours per week)
 - d. Yes, part time (on average, 20 or more hours per week)
 - e. Yes, full time (40 hours per week)
7. Where are you currently living?

- a. Residence
 - b. Apartment
 - c. Fraternity/sorority
 - d. Home (with family)
8. What was your current grade average for the last term? If you do not have any final marks yet, you may skip this question. If you do, just do your best to approximate: _____ / 100

APPENDIX B: STUDY 1 PROTOCOL

Prior to participant's arrival:

Set up experimental paperwork on a clipboard:

- Face sheet
- Get subject's name from Master List. Write on "Name sheet"
- Subject's complete Telephone Screening Questionnaire
- Consent form (2 copies)
- Prepare pregnancy test and instruction set (IF FEMALE)
- Prepare breathalyser (get new mouthpiece)
- Identify which mood condition subject will be in (check counterbalancing sheets)
- Set up computer program for questionnaires
- Set up CD player and headphones with appropriate mood condition music
- Set up bar stereo with mood condition consistent background music

Once participant arrives:

A. GREETING

Go to meet participant in waiting room and say: *"Hello, are you here for the Music and Taste Preference study?"* Verify his/her name and then say *"I'm (your name). I'll be conducting the session today."*

Bring subject into lab. Close the door. Put up "Experiment in progress. Please do not disturb" sign on the door. Record "Time started" on the Face Sheet.

B. IDENTIFICATION

Once you are settled in the experimental room, say *"First of all, may I see your ID?"* if the subject is without ID (drivers license, provincial ID, passport, or military ID) or is outside our age range (born later than today's date in 1992 or earlier than today's date in 1987) say *"I'm sorry but only people between 19 and 25 can participate in this study, and we do need to see ID."* If subject forgot ID then politely let them know that we cannot continue the experiment today, but are happy to reschedule another appointment. Record new appointment on Telephone Screening Questionnaire

C. TELEPHONE SCREENING QUESTIONNAIRE

Say *"On the telephone you gave us information about your drinking habits and medical history, which we recorded on this form. I'd like you to look over the information and verify that it is correct."*

[FOR FEMALES] *You identified during the telephone screening that you are not pregnant, not currently trying to get pregnancy, and are not breastfeeding. It is very important that this is still true. We know that alcohol consumption during pregnancy can be unhealthy for babies before they are born. Thus, if you are pregnant, planning to get pregnant, or are nursing, you should not be in the study. If your answer has changed for any of these questions, then for the reasons I just outlined, we cannot allow you to participate in this study because the study involves alcohol intake.*

When you sign the consent form you will be asked to agree that you had the opportunity to look over these responses and make any necessary changes. Please take your time.” Make any necessary changes and experimenter initial changes.

D. DRIVING AND FOOD

Now say *“I just need to ask you a few questions before we get started. Can you tell me how you got here today?”* Record on the Face Sheet. If the subject drove, then politely explain to them that since they will be consuming alcohol, we cannot have them driving themselves when they leave the experiment. Ask them to confirm that they have made alternative arrangements for when they leave. If they plan to drive themselves then let them know that we cannot continue the experiment today, but are happy to reschedule another appointment. Record new appointment on Telephone Screening Questionnaire.

Ask: *“Have you had anything to eat in the last three hours?”* Record response on Face Sheet. *“When is the last time you had something to eat? What was it that you ate then?”* Record responses on Face Sheet. *“Have you had anything to drink in the past three hours?”* Record response on Face Sheet. *“When is the last time you had anything to drink? What was it that you drank then?”* Record responses on Face Sheet. [If water, then ask *“When is the last time you had something to drink other than water? What was it that you drank then?”* Record response on Face Sheet.]

“Did you have a drink containing alcohol in the last 12 hours?” Record response on Face Sheet. *“When is the last time you had an alcoholic beverage? What did you have then?”* Record responses on Face Sheet.

“What about over the counter medications, did you take any today?” Record response on Face Sheet

Food: if subject has eaten lightly (something less than a regular sandwich) and that was more than an hour ago, subject can be run. If the subject has eaten more heavily than that or within the past hour or so, go to **Rescheduling Instructions**.

Drink: water is okay. Anything light and non-alcoholic more than a half-hour ago is okay, but a heavy drink like a latte or smoothie, if within the past hour is too much—reschedule them. Any alcohol within the last twelve hours means reschedule. Go to **Rescheduling Instructions**.

Over-the-counter medication: If they have taken any over-the-counter medications that day (in the last 12 hours), such as sleeping aids, cough and cold medications, or pain killers, then go to **Rescheduling Instructions**.

Rescheduling Instructions: Politely explain to the individual that since he/she ate/drank/took over-the-counter medications we cannot have them participate today. However, we would most appreciate them rescheduling for another day. Address any

concerns they may have, and if they are willing to reschedule then do so. Record new appointment on Telephone Screening Questionnaire.

Say *“Now is a good time to turn off your cell phone if you’ve got one on you.”* Have participants put bags/jackets on a chair in the bar lab. Seat them at the table with the computer on it.

E. CONSENT FORM

Say *“The next thing we need to do is go over the consent form for this study. I’ll ask you to sign it, but only after you’ve had a chance to read the entire thing and have had a chance to have any questions or concerns you might have addressed. Also, I would like you to know that as per the psychology department’s ethics committee requirement, you will be asked to answer a few questions about the experiment prior to being awarded your credit points.”* Give subject two copies of the informed consent form. Say *“Please take your time with this. Please also note that when you sign you are agreeing that you will not drive yourself when you leave and will remain in the lab until your BAC drops to 0.04%.”* Once participant is done reading, ask *“Do you have any questions or concerns?”* Address these then ask subject to sign both copies of the consent form. After the subject signs, take one copy of the Consent Form and give the subject the other copy. Say, *“Here’s a copy for you to keep for your own records.”*

If person chooses not to sign, address any concerns that they may have. If they still don’t want to sign then say *“It is necessary that you sign the consent form in order to participate in this experiment. However, it is your option to terminate the experiment at this time. Since we did not begin the experiment, no credit will be given. Thank you very much for your time.”* Offer subject contact information for the principal investigator (Jamie-Lee Collins, 902 818-9178, jamie.l.collins@dal.ca) and Human Subjects’ Ethics Division (Catherine Connors, 902 494-1462, catherine.connors@dal.ca) letting them know that if they have any concerns they may contact these people by phone.

F. BREATHALYZER

“I’m going to take an initial breath reading to make sure your BAC is at 0.0” Take PRE/BREATH #1 and record on Face Sheet. BAC should be at 0.0. If not, let the person know that their BAC was above zero, thus we cannot continue the experiment today, but are happy to reschedule another appointment. Record new appointment on Telephone Screening Questionnaire. If they do not wish to reschedule, then compensate them for their time up to the nearest half an hour.

G. PREGNANCY TEST (IF FEMALE)

“Before we go any further, we strongly encourage you to take a pregnancy test if there is any possibility that you may be pregnant.” It is important that you are supportive of the woman, but also encouraging that taking a pregnancy test is important given the potential dangers of alcohol to an unborn child. If the woman says no, then proceed with protocol. If she says yes, put the test in an unmarked envelope and give to the subject

1. Take sealed test packet into the women’s restroom

2. Unwrap plastic test strip from packet and remove the test from the sealed pouch. Discard empty pouch into trash can in restroom
3. Remove the cap from the capillary wick, and hold the wick directly into the urine stream for at least six seconds.
4. Return protective cap to its position over the wick
5. Bring plastic test strip back into our lab. Please hold it level.
6. The only thing you need to bring back into the lab is the plastic test strip.
7. The experimenter will read the results of the pregnancy test back in the lab.

“Any questions?” Clarify anything that needs clarifying, then show subject where bathroom is and give her a written copy of the instructions to take with her.

Once subject has returned with the test, have her set the test down on the table. It will be readable after two minutes, so you may have to wait a bit. Put latex gloves on and read the test results.

The control line (C) on the right always appears and indicates that the test is working properly. A **positive/ambiguous** test will show an appearance of a line in the test (T) area (the round window). Any appearance of a line in the test area, even very faint, indicates a positive/ambiguous result. A **negative** test will show no line.

IF **negative** test (no line in the T area), say “*Okay, it was negative. I do want to provide you with all of the information I have about the accuracy of the tests, however, before we go on. Here is a written pamphlet of the accuracy information from the manufacturer of the pregnancy test. Also, research has shown that these tests are not always as accurate as reported and that they sometimes yield false positive and negative results. A false negative result would mean that ingestion of alcohol during the study could be harmful to the developing fetus. Would you like to continue? If no, we’ll give you partial credit for your time today*”

IF **positive/ambiguous** test (line in the T area), say “*It looks like this test is ambiguous—maybe negative, maybe positive. This doesn’t mean you’re pregnant. But it does mean we can’t have you participate any further; the university will not allow us to. But we’ll give you partial credit for your time today. I do want to provide you with all of the information I have about the accuracy of the tests. Here is a written pamphlet of the accuracy information from the manufacturer of the pregnancy test. Also, research has shown that these tests are not always as accurate as reported, and that they sometimes yield false positive and negative results. If you suspect you might be pregnant, you should also check with a doctor or clinic about getting another test.*”

The key thing is to support her in hearing what may be bad news to her. Always tell the PI (Jamie-Lee Collins) immediately if a pregnancy test is positive. If Jamie-Lee Collins is not running the experiment due to a conflict of interest (i.e. if the participant is a student that Ms. Collins was a teaching assistant for), then contact Dr. Sherry Stewart instead. Inform Jamie-Lee Collins that the participant was ineligible, but do not elaborate.

H. EXPERIMENTAL SESSION

“During most of the session I will wait in an adjoining room to give you privacy. You will be told when to get me, but if you have questions at any time, just let me know. You can ring this bell here and I will come back in.” Indicate room experimenter will wait in and indicate bell.

- i. Administer state mood rating (VAS) via computer. Read instructions aloud to subject. Ensure subject understands how to respond using mouse/number pad. Leave room while they do this. A screen will come up telling subject to let you know they are done. Be ready for them to ring bell calling you back.
 - ii. Administer questionnaires via computer. Ensure subject understands how to respond using mouse/number pad. Leave room while they do this. A screen will come up telling subject to let you know that they are done. Be ready for them to ring bell calling you back. Questionnaires in this section are a demographics questionnaire, an alcohol use questionnaire, and the Rutgers Alcohol Problem Index (RAPI).
 - iii. Musical Mood Induction Procedure. Give subject CD and headphones and ask them to press play and listen to the instructions. Leave room while they do this. At the end of the musical segment, subjects will be instructed to call you back into the room. Be ready for them to ring bell calling you back.
 - iv. Re-administer state mood rating (VAS) via computer. Leave room while they do this. A screen will come up telling subject to let you know that they are done. Be ready for them to ring bell calling you back.
- **Turn on background music (consistent with mood condition) on bar stereo****
- v. Drinking task. Say *“The last part of the experiment involves the taste perception component of the study. For this part of the study, you will be asked to rate four beverages on a number of different adjectives.”* Place all four beverages (400mL of each; rum and cola, vodka and orange juice, cola, and orange juice) on the table by the participant. The alcoholic drinks will have a standard 1oz shot of the respective liquors in them. Say *“Okay, your task is to rate these four drinks on the adjectives that will appear on the computer screen. You will be given a rating scale for each adjective, you just have to identify whether or not that adjective is a good descriptor of that drink. Each adjective will appear four times, once for each drink. Please take your time with these ratings, they are very important for our study. There are a lot of adjectives so you won’t be able to complete them all so don’t rush; take your time making up your mind about each adjective. Please have as much of each beverage as you would like and as much as you need in order to make good, accurate ratings. I will be in the next room. I will come back in when this portion of the task is done. Please keep doing the ratings until I return.”* Go to bar stereo and press play on music. Start the stop watch. Keep the door to testing room slightly ajar and attend carefully to participant during this phase of the experiment, ensuring there is no unruly or destructive behaviour. After 20 minutes, return to the participant and tell them that this portion is done. Re-start stop watch NOW.
 - vi. Check BAC. Must wait ten minutes from end of taste-rating task before taking the first BAC. Say *“We need to wait ten minutes before we check your blood alcohol concentration. Please feel free to read magazines or turn on the TV.”* After ten

minutes, say *“To ensure that we measure your BAC accurately, I need you to rinse your mouth really well a few times. Please rinse and then spit the water out into this cup. Make sure you swish the water around your mouth really well (10 seconds or so) to clear out all the alcohol, and do not swallow it. Please keep rinsing until I tell you to stop.* Turn on the breathalyser and have the subject rinse within the time it takes for the machine to calibrate. Take BAC and record time (from stop watch) and BAC on Face Sheet. Then say *“I need to take your BAC every 5 minutes until I can determine your peak level. Please feel free to continue reading or watching TV, I will let you know when I need to take the next measure.”* Every 5 minutes, take BAC and record it and the time on Face Sheet. Continue to do this until peak level is determined.

Once peak level is determined, let subject know what their level is.

IF it is **above 0.04%** then let the subject know and say *“As you know, you need to remain here in the lab until your BAC is below 0.04%.”* Offer the subject snacks and water and invite them to continue reading or watching TV. Continue to administer the breathalyser every 15 minutes until BAC is at or below 0.04%. Each time, record time from stop watch and BAC. Once BAC is at or below 0.04% then continue:

IF it is **at or below 0.04%** then continue:

“Your BAC is low enough so we can finish up. Often with these kinds of studies there is a lot more that we are interested in than is immediately apparent to participants. In fact, we don’t always tell people what the full purpose of the study is, because we don’t want the study’s purpose to influence their behaviour. In your own words, would you mind telling me what you think the study was all about?” record on Face Sheet subject’s response.

Go to Debriefing sheet. Read the form aloud to the subject. Then ask the subject the experiment-related questions located at the bottom of the debriefing form. Record responses on the Face Sheet. Then ask *“What mood condition do you think that you were in—that is, do you think you listened to music that was meant to make you feel positive/good or anxious?”* Record their response on the Face Sheet. If subject was in the anxious mood condition, **have them listen to the positive mood music.** Verbally assess mood following this.

Assign bonus credit (1.5 plus a half credit per half-hour for time over 1.5 hours—round up to next half hour). Say *“We are now done, so you may leave. However, if you feel like you aren’t ready to leave yet, you are welcome to stay here a while longer and sober up a little bit more.”*

Give participant a completed Minutes to Zero slip. Say *“Alcohol metabolizes at approximately 0.015% per hour.”* Write the time on Minutes to Zero slip, rounding up to the nearest half-hour. Also record what time on the clock that will be.

<u>BAC</u>	<u>TIME TO ZERO</u>
0.0075	½ hour
0.015	1 hour
0.0225	1.5 hours
0.03	2 hours
0.0375	2.5 hours
0.04	2 hours and 40 minutes

Say *“This is just a visual reminder of how long it will be until your BAC is at zero. Please don’t drive until about (whatever time you put on the slip). Okay, unless there’s anything else I can do for you, or questions you have, we’re all done. Thanks again for coming in.”*

Show the subject out.

Destroy “Name sheet”

APPENDIX C: LIEBOWITZ SOCIAL ANXIETY SCALE

(Liebowitz, 1987; used in Study 2a, Study 2b, and Study 3)

Please indicate the amount of fear or anxiety, and separately, the degree to which you avoid each of the following situations. Make sure you use the proper scale for each of your ratings.

Fear or Anxiety

0 = None

1 = Mild

2 = Moderate

3 = Severe

***Avoidance**

0 = Never (0%)

1 = Occasionally (1-33%)

2 = Often (33-67%)

3 = Usually (67-100%)

1. Telephoning in public.
2. Participating in small groups.
3. Eating in public places.
4. Drinking with others in public places.
5. Talking to people in authority.
6. Acting, performing or giving a talk in front of an audience.
7. Going to a party.
8. Working while being observed.
9. Writing while being observed.
10. Calling someone you don't know very well.
11. Talking with people you don't know very well.
12. Meeting strangers.
13. Urinating in a public bathroom.
14. Entering a room when others are already seated.
15. Being the centre of attention.
16. Speaking up at a meeting.
17. Taking a test.
18. Expressing a disagreement or disapproval to people you don't know very well.
19. Looking at people you don't know very well in the eyes.
20. Giving a report to a group.
21. Trying to pick up someone.
22. Returning goods to a store.
23. Giving a party.
24. Resisting a high pressure salesperson.

* indicates a scale that was used in current dissertation.

APPENDIX D: MODIFIED DRINKING MOTIVES QUESTIONNAIRE- REVISED
(Grant et al., 2007; used in Study 1, Study 2a, Study 2b, and Study 3)

Below is a list of reasons people sometimes give for drinking alcohol. Thinking of all the times you drink, how often would you say that you drink for each of the following reasons?

IF you do NOT drink ALCOHOL: Please fill in “F” (Not applicable) for **EACH** question on the Bubble Sheet.

IF you do drink ALCOHOL: Please answer **ALL** questions on the Bubble Sheet using the rating scale below.

A = Almost Never / Never

B = Some of the Time

C = Half of the Time

D = Most of the Time

E = Almost Always / Always

F = Not Applicable (Only if you do NOT drink alcohol)

- | | | | | | | |
|---|---|---|---|---|---|---|
| 1. As a way to celebrate. | A | B | C | D | E | F |
| 2. To relax. | A | B | C | D | E | F |
| 3. Because I like the feeling. | A | B | C | D | E | F |
| 4. Because it is what most of my friends do when we get together. | A | B | C | D | E | F |
| 5. To forget my worries. | A | B | C | D | E | F |
| 6. Because it is exciting. | A | B | C | D | E | F |
| 7. To be sociable. | A | B | C | D | E | F |
| 8. Because I feel more self-confident or sure of myself. | A | B | C | D | E | F |
| 9. To get a high. | A | B | C | D | E | F |
| 10. Because it is customary on special occasions. | A | B | C | D | E | F |
| 11. Because it helps me when I am feeling nervous. | A | B | C | D | E | F |
| 12. Because it's fun. | A | B | C | D | E | F |
| 13. Because it makes a social gathering more enjoyable. | A | B | C | D | E | F |
| 14. To cheer me up when I'm in a bad mood. | A | B | C | D | E | F |
| 15. To be liked. | A | B | C | D | E | F |
| 16. To numb my pain. | A | B | C | D | E | F |
| 17. Because it helps me when I am feeling depressed. | A | B | C | D | E | F |
| 18. So that others won't kid me about not using. | A | B | C | D | E | F |
| 19. To reduce my anxiety. | A | B | C | D | E | F |
| 20. To stop me from dwelling on things. | A | B | C | D | E | F |
| 21. To turn off negative thoughts about myself. | A | B | C | D | E | F |
| 22. To help me feel more positive about things in my life. | A | B | C | D | E | F |
| 23. To stop me from feeling so hopeless about the future. | A | B | C | D | E | F |
| 24. Because my friends pressure me to use. | A | B | C | D | E | F |
| 25. To fit in with a group I like. | A | B | C | D | E | F |
| 26. Because it makes me feel good. | A | B | C | D | E | F |
| 27. To forget painful memories | A | B | C | D | E | F |
| 28. So I won't feel left out. | A | B | C | D | E | F |

Scoring:

Social Motives: Items 1, 4, 7, 10, 13

Coping with Anxiety Motives (CAM): Items 2, 8, 11, 19

Coping with Depression Motives (CDM): Items 5, 14, 16, 17, 20, 21, 22, 23, 27

Conformity Motives: Items 15, 18, 24, 25, 28

Enhancement Motives: Items 3, 6, 9, 12, 26

APPENDIX E: LIFESTYLE QUESTIONNAIRE

(Used in Study 1, Study 2a, Study 2b, and Study 3)

Please read each of the following questions and choose the statement that best describes you. Please choose only one answer per question.

1. How often did you consume alcohol in the past 30 days?
 - A Once
 - B 2 or 3 times
 - C 4 or 5 times
 - D 6 or more times
 - E Not Applicable (Only if you did NOT drink alcohol in the past 30 days)
2. On average, in the past 30 days, how many drinks containing alcohol did you consume on a typical day when you were drinking?
 - A Once
 - B 2 or 3
 - C 4 or 5
 - D 6 to 9
 - E 10 or more
 - F Not Applicable (Only if you did NOT drink alcohol in the past 30 days)

1 drink =



**1 Glass of
Wine**

**1 Can or
bottle of
beer**

**1 Shot of
hard liquor**

1 Cooler

3. How many days did you smoke cigarettes in the past 30 days?
 - A One or 2 days
 - B 3 to 7 days
 - C 8 to 14 days
 - D 15 to 30 days
 - E Not Applicable (Only if you did NOT smoke cigarettes in the past 30 days)
4. On average, in the past 30 days, how many cigarettes did you smoke on a typical day when you were smoking?
 - A Less than 1 (e.g. a couple of 'drags')
 - B 1-5
 - C 6-10
 - D Half of a pack
 - E 1 pack or more
 - F Not Applicable (Only if you did NOT smoke cigarettes in the past 30 days)

5. How often did you use marijuana/hashish in the past 30 days?
- A Once
 - B 2 or 3 times
 - C 4 or 5 times
 - D 6 or more times
 - E Not Applicable (Only if you did NOT use marijuana/hashish in the past 30 days)
6. How often did you exercise in the past 30 days (going to the gym, playing sports, walking the dog, walking to work, power-walking, yoga, gardening, house cleaning, etc.)
- A Not at all
 - B Once
 - C 2 or 3 times
 - D 4 or 5 times
 - E More than 6 times
 - F Not Applicable (Only if you did NOT exercise in the past 30 days)
7. On average, in the past 30 days, how much time did you spend on a typical day when you were exercising?
- A 15mins to 30mins
 - B 30mins to 1hr
 - C 1hr to 2hrs
 - D 2hrs to 3hrs
 - E More than 3hrs
 - F Not Applicable (Only if you did NOT exercise in the past 30 days)
8. How often did you gamble (e.g., VLT's, slots, cards for money, bingo, etc.), excluding lottery tickets, in the past 30 days?
- A Once
 - B Twice
 - C 3 or 5 times
 - D More than 6 times
 - E Not Applicable (Only if you did NOT gamble in the past 30 days)
9. On average, in the past 30 days, how much money did you gamble on a typical day when you were gambling?
- A \$1 - \$10
 - B \$11 - \$50
 - C \$51 - \$100
 - D \$101 - \$200
 - E More than \$200
 - F Not Applicable (Only if you did NOT gamble in the past 30 days)
10. How often did you use the internet in the past 30 days?
- A Once
 - B 2 or 3 times

- C 4 or 5 times
- D 6 or more times
- E Not Applicable (Only if you did NOT use the internet in the past 30 days)

11. On average, in the past 30 days, how much time did you spend on the internet on a typical day?

- A 15mins to 30mins
- B 31mins to 1hr
- C 61mins to 2hrs
- D 121mins to 3hrs
- E More than 3hrs
- F Not Applicable (Only if you did NOT use the internet in the past 30 days)

12. What is your favorite style of music?

- A Classical/Jazz
- B Country & Western/Folk
- C Rock /Alternative
- D Rap & Hip Hop/Trip Hop
- E Soul/R & B/Reggae

13. How often do you concentrate on listening to music? (i.e. not simply using it as background)

- A Less than once a month
- B Once a month
- C Once a week
- D Once a day
- E Several times a day

14. What function does music play in your life?

- A Relaxes me
- B Gives me energy
- C Helps me to forget about everyday problems
- D Pure entertainment
- E Helps me to study or work more efficiently
- F None of the above

APPENDIX F: RUTGERS ALCOHOL PROBLEM INDEX
(White & Labouvie, 1989; used in Study 1, Study 2a, Study 2b, and Study 3)

Instructions: Different things happen to people when they are drinking alcohol, or as a result of their alcohol use. Some of these things are listed below. Please indicate how many times each has happened to you during the last 3 years while you were drinking alcohol or as a result of your alcohol use by selecting the number corresponding with your response.

Response options

- 1 = Never
- 2 = 1-2 times
- 3 = 3-5 times
- 4 = 6-8 times
- 5 = More than 8 times

Items

1. Not able to do your homework or study for a test
2. Got into fights, acted bad, or did mean things
3. Missed out on other things because you spent too much money on alcohol
4. Went to work or school high or drunk
5. Caused shame or embarrassment to someone
6. Neglected your responsibilities
7. Relatives avoided you
8. Felt that you needed more alcohol than you used to in order to get the same effect
9. Tried to control your drinking by trying to drink only at certain times of day or certain places
10. Had withdrawal symptoms, that is, felt sick because you stopped or cut down on drinking
11. Noticed a change in your personality
12. Felt that you had a problem with school
13. Missed a day (or part of a day) of school or work
14. Tried to cut down on drinking
15. Suddenly found yourself in a place that you could not remember getting to
16. Passed out or fainted suddenly
17. Had a fight, argument, or bad feelings with a friend
18. Had a fight, argument or bad feelings with a family member
19. Kept drinking when you promised yourself not to
20. Felt you were going crazy
21. Had a bad time
22. Felt physically or physiologically dependent on alcohol
23. Was told by a friend or neighbor to stop or cut down drinking

APPENDIX G: DRINKING DUE TO SOCIAL ANXIETY QUESTIONNAIRE

(Stevens & Gerlach, 2009; Used in Study 2b)

In the following, you will find a number of statements concerning emotions, thoughts and behaviors that may or may not occur in the context of alcohol use.

Please read each of the following statements carefully and indicate how characteristic the statement was of you **during the last month** according to the scale. Mark a box to indicate how characteristic the statement is of you.

Situation	Not at all	Slightly	Moderately	Very	Extremely	How often occurred this situation in the last 30 days?
	characteristic or true of me					
1. I felt safer when interacting with strangers after drinking alcohol	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
2. After drinking alcohol, I was less nervous when starting a conversation with a person I did not know well	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
3. I drank alcohol so I wouldn't have to think about what impression I made on others	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
4. When I was in a diner or a restaurant, I drank alcohol to feel safer and less nervous	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
5. I drank to overcome my shyness	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
6. I drank alcohol to feel less self-conscious when I was the centre of attention	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
7. Drinking helped me to suppress feelings of inferiority	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
8. I drank alcohol so I could talk more freely and be more relaxed with other people	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
9. I drank alcohol in order to be less nervous during an exam	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
10. I drank alcohol to fight my fear of criticism and rejection by others	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
11. When I had to talk to people in authority (teachers, superiors), I drank alcohol in order to be less nervous	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
12. I drank alcohol so I would have less anxiety when speaking in public	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
13. Alcohol helped me to be less self-conscious in social situations or whenever I was expected to be socially	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

active						
14. I drank alcohol in order to self-medicate my fear of embarrassing myself in front of others	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
15. I drank alcohol in order to be less tense in performance situations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
16. After drinking, I felt better able to express my opinions and convictions to others	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
17. Alcohol helped me to be less tense and nervous whenever I had to eat with unfamiliar people	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
18. When I was unable to avoid uncomfortable social situations, I sometimes drank alcohol in order to be less anxious	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
19. Alcohol helped me to have less anxiety when talking to unfamiliar people	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
20. I drank alcohol in order to feel less nervous and tense in group situations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
21. Drinking helped me to interact with others in a more relaxed way	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
22. After drinking I was better able to share my feelings and thoughts with a person of the opposite sex	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
23. I drank alcohol in order to feel less self-conscious or tense when speaking in public	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
24. I was easier for me to approach an attractive person of the opposite sex after drinking alcohol	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
25. I was better able to get to know people after drinking alcohol	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
26. I drank alcohol to be less self-conscious or tense while giving a speech in front of an audience.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
27. At parties or official social gatherings I drank alcohol in order to be more relaxed and less tense	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
28. After drinking alcohol I was better able to hold my ground with authorities or people I was afraid of.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

APPENDIX H: DRINKING CONTEXT SCALE- REVISED

(O'Hare, 1997; Used in Study 2b)

Based on your personal experience, how would you RATE THE CHANCES that you might find yourself drinking excessively *in* (i.e., during) the following circumstances? (Use the following scale to rate your responses.)

	Extremely High 5	High 4	Moderate 3	Low 2	Extremely Low 1
1. When I'm lonely or homesick	5	4	3	2	1
2. When I'm at a bar or club	5	4	3	2	1
3. When I'm with the person who is my lover	5	4	3	2	1
4. When I'm finished work that I do for pay	5	4	3	2	1
5. When I'm on a date	5	4	3	2	1
6. When I'm at a party	5	4	3	2	1
7. When I'm at a concert	5	4	3	2	1
8. When I've had a fight with someone close to me	5	4	3	2	1
9. When it's the beginning or middle of the week	5	4	3	2	1
10. When I'm with a close friend or few friends	5	4	3	2	1
11. When it's during semester breaks or holidays	5	4	3	2	1
12. Before having sex	5	4	3	2	1
13. When I'm enjoying TV, music, video games	5	4	3	2	1
14. When I'm with a large group of acquaintances	5	4	3	2	1
15. When I'm at a restaurant ordering a meal	5	4	3	2	1
16. When it's during the school semester	5	4	3	2	1
17. When it's toward the end of the week or weekend	5	4	3	2	1
18. When I'm having trouble relaxing, winding down	5	4	3	2	1
19. When I'm feeling sad, depressed, or discouraged	5	4	3	2	1
20. When I'm celebrating something important to me	5	4	3	2	1
21. When I'm angry with myself or someone else	5	4	3	2	1
22. When others around me are partying	5	4	3	2	1
23. When I'm finished with my school work	5	4	3	2	1

Scoring:

Social context: Items 2, 6, 10, 11, 14, 17, 20, 22

*Personal/intimate context: Items 3, 4, 5, 7, 9, 12, 13, 15, 16, 23

*Negative emotional context: Items 1, 8, 18, 19, 21

* indicates a scale that was used in current dissertation.