

Social Anxiety and Alcohol Use: Examining the Relationships among Social Anxiety, Anxiety  
Sensitivity, and Alcohol-Related Variables

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A thesis submitted to the Faculty of Graduate Studies

In partial fulfillment of the requirements for the degree of

Master of Arts (Clinical Psychology)

Department of Psychology

Lakehead University

Thunder Bay, Ontario

August 2015

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### Abstract

Socially anxious undergraduates tend to report more alcohol-related problems despite consuming less alcohol than non-anxious counterparts. The present study aimed to clarify this paradox by examining the roles of anxiety sensitivity, motives for drinking and cognitive/behavioural factors proposed to maintain social anxiety (SA): rumination, post-event processing, anticipatory processing, self-focused attention, and safety behaviours. Undergraduates ( $N = 180$ ) completed self-report measures assessing: SA, SA-maintaining factors, anxiety sensitivity, alcohol consumption, drinking motives and alcohol-related problems. Significant positive correlations emerged among most measures of SA, SA-maintaining factors, anxiety sensitivity, negative drinking motives and alcohol-related problems. Alternatively, quantity and frequency of alcohol use were not significantly associated with SA, SA-maintaining factors or anxiety sensitivity. Mediation analyses revealed that only anticipatory processing mediated the relationship between anxiety sensitivity and anxious coping-motivated drinking. Alternatively, rumination, anticipatory processing and safety behaviours mediated the relationship between anxiety sensitivity and conformity-motivated drinking. Findings also revealed that while depressive and anxious coping drinking motives mediated the relationship between post-event processing and alcohol-related problems, only depressive coping drinking motives mediated the relationships between SA/the remaining SA-maintaining factors and alcohol-related problems. Overall, this research clarifies our understanding of the relationships between subclinical SA and problematic drinking patterns in young adults.

### Acknowledgements

I would like to express gratitude to my thesis supervisor, Dr. Amanda Maranzan, for her continued guidance and support over the past two years. I have learned a great deal along the way and am thankful for all that you have done.

I am also grateful to my second committee member, Dr. Christopher Mushquash, and my external examiner, Dr. Mirella Stroink, for taking the time to read my thesis. I appreciate all of the valuable feedback you have given.

Last, but not least, I would like to thank all of the students at Lakehead University who made this thesis possible by participating in my study.

## Table of Contents

Introduction.....	9
Cognitive Models of Social Anxiety .....	10
Anxiety Sensitivity .....	19
Social Anxiety and Alcohol Use.....	20
Alcohol Use and Anxiety Sensitivity.....	24
Current Study .....	26
Method .....	28
Participants.....	28
Measures .....	28
Procedure .....	37
Analyses.....	37
Results.....	38
Discussion.....	65
References.....	80
Appendices.....	96

## List of Tables

Table 1 – Means, Standard Deviations, Cronbach’s Alphas and % of Missing Data ( $n = 180$ )...	40
Table 2 – Correlations Between SA, SA-Maintaining Factors and Anxiety Sensitivity .....	42
Table 3 - Correlations Between SA and Alcohol-Related Variables.....	44
Table 4 - Correlations Between SA-Maintaining Factors and Alcohol-Related Variables .....	45
Table 5 - Correlations Between Anxiety Sensitivity and Alcohol-Related Variables.....	46
Table 6 - Direct and Indirect Effects of Anxiety Sensitivity on Negative Drinking Motives .....	49
Table 7 - Direct and Indirect Effects of SA on Alcohol-Related Problems.....	56
Table 8 - Direct and Indirect Effects of SA-Maintaining Factors on Alcohol-Related Problems..	
.....	63

## List of Figures

Figure 1 - Model examining SA-maintaining factors as mediators of the relationship between anxiety sensitivity and anxious coping motives.....	48
Figure 2 - Model examining SA-maintaining factors as mediators of the relationship between anxiety sensitivity and depressive coping motives .....	50
Figure 3 - Model examining SA-maintaining factors as mediators of the relationship between anxiety sensitivity and conformity motives .....	52
Figure 4 - Model examining negative drinking motives as mediators of the relationship between social interaction anxiety and alcohol-related problems.....	53
Figure 5 - Model examining negative drinking motives as mediators of the relationship between social evaluation anxiety and alcohol-related problems .....	54
Figure 6 - Model examining negative drinking motives as mediators of the relationship between public speaking anxiety and alcohol-related problems.....	55
Figure 7 - Model examining negative drinking motives as mediators of the relationship between rumination and alcohol-related problems .....	58
Figure 8 - Model examining negative drinking motives as mediators of the relationship between post-event processing and alcohol-related problems .....	59
Figure 9 - Model examining negative drinking motives as mediators of the relationship between anticipatory processing and alcohol-related problems.....	60
Figure 10 - Model examining negative drinking motives as mediators of the relationship between self-focused attention and alcohol-related problems .....	61

Figure 11 - Model examining negative drinking motives as mediators of the relationship between safety behaviours and alcohol-related problems..... 62

## List of Appendices

Appendix A: Social Interaction Anxiety Scale (SIAS).....	96
Appendix B: Social Phobia Scale (SPS).....	97
Appendix C: Short Personal Report of Confidence as a Speaker Scale (PRCS-S-12).....	98
Appendix D: Rumination Reflection Questionnaire – Rumination (RRQ-Rum).....	99
Appendix E: Social Anxiety Rumination Questionnaire – Trait (SARQ-T).....	100
Appendix F: Anticipatory Social Behaviours Questionnaire (ASBQ).....	102
Appendix G: Trait Self-Focused Attention Questionnaire (TSFAQ).....	103
Appendix H: Social Phobia Safety Behaviours Scale (SPSBS).....	104
Appendix I: Anxiety Sensitivity Index – 3 (ASI-3).....	105
Appendix J: Alcohol Use Questionnaire (AUQ).....	106
Appendix K: Modified Drinking Motives Questionnaire – Revised (M-DMQ-R).....	107
Appendix L: Rutgers Alcohol Problem Index (RAPI).....	108
Appendix M: Repetitive Thinking Questionnaire (RTQ).....	109
Appendix N: Demographic Questionnaire.....	111
Appendix O: Liebowitz Social Anxiety Scale – Self-Report – Social Avoidance Subscale (LSAS-SR-SA).....	112
Appendix P: Depression Anxiety Stress Scale – 21 (DASS-21).....	113
Appendix Q: Informed Consent Form.....	115
Appendix R: Debriefing Form.....	118



## Social Anxiety and Alcohol Use: Examining the Relationships among Social Anxiety, Anxiety Sensitivity, and Alcohol-Related Variables

Social anxiety (SA) is a form of anxiety characterized by persistent “fear or anxiety about one or more social situations in which [an] individual is exposed to possible scrutiny by others” (American Psychiatric Association, 2013, p. 202). Individuals may experience SA in response to various social situations, including interactions with others, being observed, and/or performance-type situations (American Psychiatric Association, 2013). Although socially anxious individuals’ anxiety is often restricted to certain types of encounters (e.g., public speaking or interaction with others), it may also occur more broadly across multiple social contexts. While more generalized SA is often proposed to influence individuals more severely than specific subtypes (Brown, Heimberg, & Juster, 1995), those suffering from any form may experience the undesirable and distressing effects of the disorder.

SA typically emerges for the first time during childhood or adolescence, with 75% of sufferers showing initial symptoms between the ages of 8 and 15 years (APA, 2013, p. 205). During adolescence, SA appears to contribute to problems in various domains, including school, friendships and extracurricular activities (Khalid-Khan, Santibanez, McMicken, & Rynn, 2007). At this time, 12-month prevalence rates range from 3.0 to 3.2% (Wittchen, Stein, & Kessler, 1999; Ranta, Kaltiala-Heino, Rantanen, & Marttunen, 2009), with an even higher rate of 4.6% when subclinical levels of anxiety are considered (Ranta et al., 2009). Research has also found rates of SA to increase following adolescence, with 12-month prevalence rates of 7.1%, and lifetime rates of 12.1%, among those 18 years of age and older (Ruscio, Brown, Chiu, Sareen, Stein, et al., 2007). Problems continue into adulthood, with SA often contributing to difficulties such as lower job attainment, minimized work functioning, less social support, and poorer

quality of life (for a review, see Mendlowicz & Stein, 2000). During adulthood, prevalence rates are also high, with lifetime rates estimated to be as great as 12% in the general population (Kessler, Berglund, Demler, Jun, & Walters, 2005). Furthermore, many individuals with SA do not seek professional help or treatment (Ballenger, 1999; Fehm, Pelissolo, Furmack, & Wittchen, 2005; Kessler, 2003), thereby making it conceivable for prevalence rates to be much higher than estimated.

### **Cognitive Models of Social Anxiety**

Various theoretical models have attempted to explain the maintenance of SA, including cognitive models by Clark and Wells (1995) and Rapee and Heimberg (1997). According to these models, SA is associated with a strong desire to portray oneself favorably to others, as well as an inherent assumption that others are highly critical. Individuals suffering from SA therefore tend to assume that they will be unable to meet others' high expectations, and fear that negative consequences will ensue (Clark & Wells, 1995; Rapee & Heimberg, 1997). According to Clark and Wells' (1995) cognitive model, a number of factors contribute to the maintenance of SA over time. These include forms of repetitive negative thinking such as rumination, post-event processing and anticipatory processing, as well as increased self-focused attention and use of in-situ safety behaviours. Clark and Wells (1995) posit that all of these factors are central to understanding SA, and each will therefore be discussed in further detail.

**Rumination and Post-event Processing.** Rumination is defined as a mode of responding in which an individual repeatedly and passively reflects on feelings of distress, as well as possible causes and consequences of those feelings (Nolen-Hoeksema, 1991). Although initially identified as a cognitive vulnerability for depression (Nolen-Hoeksema, 1991), researchers now recognize the role of rumination in anxiety (Harrington & Blankenship, 2002; Nolen-Hoeksema,

2000; Blagden & Craske, 1996), including SA. For instance, in a recent treatment study, Brozovich et al. (2015) found that greater pre-treatment levels of (brooding) rumination predicted weekly levels of rumination and SA during treatment. Additionally, rumination appeared to contribute to fluctuations in SA, with weekly levels of rumination predicting weekly levels of SA. Evidently, these findings provide evidence that rumination serves to maintain SA over time.

Among those with elevated SA, rumination is often related to an anxiety-provoking social event that the individual has experienced. In the SA literature, such rumination is commonly referred to as post-event processing. Post-event processing involves paying close attention to a past social event, while focusing more specifically on the negative details of the event (Clark & Wells, 1995). Research has examined the relationship between SA and post-event processing and findings suggest that those high in SA experience greater post-event processing than those without SA following both social interactions (Dannahy & Stopa, 2007; Mellings & Alden, 2000) and performance-type situations (Abbott & Rapee, 2004; Edwards, Rapee, & Franklin, 2003). For instance, in one study, socially anxious and non-anxious participants completed an impromptu speech and their engagement in post-event processing was assessed over the subsequent week (Abbott & Rapee, 2004). The researchers found that during this time, the clinical sample reported engaging in significantly more rumination than the non-anxious participants. Additionally, in another study by Laposa and Rector (2011), the researchers found that pre-treatment levels of SA and level of anxiety during exposure, was associated with higher levels of post-event processing following exposure to a social stressor. Such findings provide evidence for the role of post-event processing among those with elevated levels of SA.

Research has also verified the presence of post-event processing in socially anxious

undergraduate samples. For instance, Kocovski, Endler, Rector, & Flett (2005) presented undergraduates with vignettes involving interaction and performance-type situations, and asked participants to record their ensuing thoughts. Findings revealed that compared to those with low SA, those high in SA were more likely to ruminate and less likely to self-distract. Further examination also revealed that highly anxious individuals experienced ruminative thoughts that were more negative than the thoughts of non-anxious participants. Similarly, in another study of undergraduates (Mellings and Alden, 2000), socially anxious participants were found to engage in significantly more post-event processing than non-anxious participants following a social interaction with a confederate. Findings also showed that post-event processing predicted participants' recall of negative self-relevant information during the social interaction.

In addition to examining the relationship between symptoms of SA and post-event processing, research has also examined how post-event processing is related to other factors that maintain SA. For instance research has found an association between post-event processing and self-focused attention (Gaydukevych & Kocovski, 2012). In this study, socially anxious undergraduates engaged in a conversation with a confederate while their focus of attention was altered via verbal instructions. Findings revealed that those who were led to self-focus experienced greater negative post-event processing than those who engaged in less self-focused attention. Post-event processing has also been empirically linked to matters such as alcohol use, with research showing a positive association between amount of alcohol consumed at a social event and engagement in post-event processing following the event (Battista & Kocovski, 2010). Overall, research has provided clear support for the presence of post-event processing among those with elevated SA, as well as its relationship to other aspects of SA such as self-focused attention.

**Self-focused Attention.** According to cognitive models (Rapee & Heimberg, 1997; Clark & Wells, 1995), socially anxious individuals also tend to engage in excessive self-focused attention when faced with anxiety-provoking social situations. When this occurs, the socially anxious individual directs their attention away from external cues and begins focusing on internal, self-relevant information. For example, during a speech, a socially anxious individual may shift their attention away from the audience and begin to focus on their physical appearance (e.g., blushing) and/or bodily sensations (e.g., racing heartbeat). Many studies have examined the role of self-focused attention in SA (see Stopa & Clark, 1993 for a review), with findings showing that self-focused attention is higher among those with subclinical and clinically elevated levels of SA. For instance, research has found that undergraduates who are high (versus low) in SA report higher levels of self-focused attention (Glick & Orsillo, 2011) and are significantly more likely to self-focus during a social interaction (Mellings & Alden, 2000). Self-focused attention has also been found to influence level of SA among those diagnosed with SAD (Woody & Rodriguez, 2000).

Self-focused attention is particularly problematic among those with SA for a number of reasons. First, self-focused attention has been found to increase levels of SA. For instance, research by Zou, Hudson, and Rapee (2007) has found that those who frequently blush during social situations report greater SA when led to self-focus than when asked to engage in a task-focused condition. Self-focused attention is also proposed to increase one's self-awareness, thereby decreasing one's ability to process potentially positive environmental cues (Clark and Wells, 1995). For example, research has found that when self-focused attention is increased in socially anxious undergraduates, those with high (versus low) SA display greater memory for anxiety-related physiological cues (Ashbaugh & Radomsky, 2009). Research has also found that

undergraduates with higher levels of SA recall less information about their partner during a social interaction, as well as more negative information about themselves (Mellings & Alden, 2000). Overall, research has demonstrated the problematic nature of self-focused attention among those with elevated SA. Importantly, effective treatments for those diagnosed with SAD often involve attempts at reducing the amount of negative self-focused attention that the individual engages in (Hofmann, Moscovitch, Kim, & Taylor, 2004; Hofmann, 2000; Woody, Chambless, & Glass, 1997).

**Anticipatory Processing.** Prior to a social situation, socially anxious individuals are proposed to engage in a form of repetitive negative thinking known as anticipatory processing. Anticipatory processing occurs as the individual begins to focus on themes of past failures, poor performances, humiliation and rejection, and subsequently draws negative conclusions about how he or she will perform during an upcoming social situation. As a result, the individual also begins experiencing increased levels of SA (Clark & Wells, 1995). Anticipatory processing has been empirically investigated and found to have a number of undesirable effects on socially anxious individuals. For instance, during public-speaking tasks, it has been shown to elicit higher levels of self-reported and psychophysiological anxiety (Vassilopoulos, 2005; Wong & Moulds, 2011), as well as more negative self-perceptions about one's performance (Vassilopoulos, 2005). Socially anxious university students have also been found to spend more time thinking about an upcoming social stressor, experience thoughts that are more intrusive and that interfere with their ability to concentrate, and experience increased levels of anxiety as a result (Vassilopoulos, 2004).

The effects of anticipatory processing also appear to extend beyond the period leading up to a social event. For example, in a series of two pilot studies, Hinrichsen and Clark (2003) had

participants high and low in SA engage in anticipatory thinking or self-distraction prior to giving a speech. Findings revealed that anticipatory processing served to maintain higher levels of anxiety leading up to the speech, as well as increase levels of anxiety during the speech. Notably, these findings were observed in individuals both high and low in SA. Interestingly, while findings by Hinrichsen and Clark (2003) indicate that anticipatory processing is problematic regardless of anxiety severity, other research suggests that those who are higher in SA may in fact experience more substantial effects. For example, in one study, Wong and Moulds (2011) led individuals high and low in SA to engage in anticipatory processing or distraction prior to a speech. Findings revealed that those high in SA experienced increased anxiety and skin conductance, as well as stronger conditional (e.g. “If I make mistakes others will reject me”) and high standard (e.g. “I must give a perfect presentation”) beliefs than those led to distract. Anticipatory processing also predicted increases in SA, which subsequently predicted poorer speech performance. Alternatively, among those who were low in SA, anticipatory processing only resulted in higher levels of anxiety.

Additional research has also shown anticipatory processing to differentially influence how socially anxious and non-anxious individuals view themselves while performing a speech. More specifically, in a study by Brown and Stopa (2006), highly anxious and non-anxious university students were asked to present one speech following a 10-minute period of anticipatory processing, and another following a 10-minute period of distraction. Findings revealed that when given the opportunity to anticipate and prepare for the speech, those high in SA were more likely to switch from a field to outsider perspective. Notably, cognitive models have proposed that viewing oneself from an outsider perspective also serves to maintain SA (Clark and Wells, 1995). Brown and Stopa (2006) also found that when given time to anticipate

and prepare for the speech, those low in SA reported a decrease in negative thoughts, whereas those high in SA reported high frequencies of negative thoughts. Such findings suggest that while preparatory time may be useful for those low in SA, it may actually serve to increase distress in highly socially anxious individuals.

While the majority of research has focused on examining anticipatory processing in non-clinical samples (i.e., university students), research has also provided strong evidence for its presence in clinical populations. In one study, Lorberbaum, Kose, Johnson, Arana, Sullivan, Hamner, et al. (2004) examined the neural correlates of anticipatory processing by asking a group of individuals diagnosed with SAD and another group of healthy controls to anticipate and give a speech while undergoing an f-MRI. Findings revealed the socially anxious group reported higher levels of anxiety during the anticipatory period, and were the only participants to experience an increase in anxiety. Additionally, these individuals displayed greater cortical activity in brain regions implicated in emotional processing (i.e., the “amygdala/uncus/ anterior parahippocampus”, insula, temporal pole, anterior pons, and ventral striatum), and less activity in regions implicated in cognitive processing (i.e., the “dorsal anterior cingulate/prefrontal cortex”) (Lorberbaum et al., 2004, p. 2702-2703). Alternatively, research has shown pregabalin, an anticonvulsant drug shown to be effective in reducing symptoms of SA (Pande, Feltner, Jefferson, Davidson, Pollack, et al., 2004), to have opposite effects on some of these brain regions during an experimentally induced anticipatory period. More specifically, this drug has been found to decrease activity in the anterior insula and increase activity in the anterior cingulate and anterior insula (Aupperle, Ravindran, Tankersley, Flagan, Stein, et al., 2011). Overall, these findings provide evidence for the presence and problematic nature of anticipatory processing among those with clinical and subclinical levels of SA.



**Safety Behaviours.** Lastly, cognitive models propose that socially anxious individuals are particularly likely to perform in-situ safety behaviours when faced with anxiety-provoking social situations (Rapee & Heimberg, 1997; Clark & Wells, 1995). Safety behaviours can be defined as cognitive and/or behavioural strategies that socially anxious individuals use to reduce feelings of anxiety and fear of being negatively evaluated by others (Clark & McManus, 2002). It is important to note that while safety behaviours are utilized as a temporary means of reducing discomfort, these strategies frequently serve to exacerbate and maintain anxiety. More specifically, safety behaviours reduce one's ability to disconfirm negative beliefs they have regarding a social situation (Clark & Wells, 1995), and frequently lead individuals to attribute any positive situational outcomes to the use of safety behaviours (Salkovskis, 1991). For instance, a socially anxious individual may reduce the frequency or duration of their speech to temporarily reduce distress, and may subsequently conclude that the only reason they made it through the situation was because they spoke very little. Additional examples of safety behaviours include, but are not limited to: avoiding eye contact, speaking rapidly, and sitting in the back of a crowded room so as not to be seen by others.

Interestingly, research has also examined the relationship between alcohol consumption and use of safety behaviours among socially anxious individuals. More specifically, research by Battista, MacDonald, and Stewart (2012) examined the effects of alcohol on various observer-rated safety behaviours during a social interaction, which included avoiding eye contact, reducing speaking time, nervous laughter, and latency to respond to questions. Findings revealed that following alcohol consumption, socially anxious undergraduates displayed a rise in speech, with speaking time increasing from an average of approximately 192 seconds to 238 seconds. As mentioned by Battista et al. (2012) however, additional research on the relationship between

alcohol use and safety behaviours among socially anxious individuals is necessary, as existing studies largely fail to consider SA in particular. Research has, however, demonstrated this relationship among those with panic disorder, with findings showing that alcohol reduces the likelihood of engaging in a safety behavior known as facial masking (intentionally covering one's face to hide distress or fear) during a panic-inducing manipulation (Kushner, Massie, Gaskel, & Mackenzie, 1997). Additional research has also found that university students who are given alcohol during a self-disclosing speech display significantly lower levels of negative facial emotion such as gaze aversion (Sayette, Smith, Breiner, and Wilson, 1992). Alternatively, research has found that men, but not women, are more likely to self-disclose to a confederate of the opposite sex when they consume a moderate amount of alcohol prior to the interaction (Caudill, Wilson, & Abrams, 1987).

While more recent research is needed to explore how factors like alcohol use influence socially anxious individuals' engagement in safety behaviours, existing research largely supports the use of safety behaviours among those with SA. For instance, research has demonstrated that those high in SA display more frequent use of SBs, as well as greater variety of safety behaviours, than those without SA (McManus et al., 2008). Other research proposes that socially anxious individuals do not engage in more safety behaviours than non-anxious counterparts, but do experience more negative consequences as a result. More specifically, Okajima, Kanai, Chen, and Sakano (2009) found that safety behaviours were more strongly associated with negative beliefs and anxiety among undergraduates meeting DSM-IV criteria for SAD and a clinical sample of those diagnosed with SAD, than among a group of non-anxious undergraduates. Research involving both interaction and speech-type tasks has also shown socially anxious individuals to report greater use of safety behaviours, display higher levels of anxiety, and be

rated as performing more negatively than those without SA (Kim, 2005). Additional support for the role of safety behaviours comes from research showing that exposure tasks focused on reducing safety behaviours proves to be more effective at reducing SA than those without a focus on safety behaviour reduction (Taylor & Alden, 2010; Kim, 2005; Wells, Clark, Salkovskis, Ludgate, Hackmann, & Gelder, 1995).

### **Anxiety Sensitivity**

A factor that has received increasing attention in the context of anxiety is anxiety sensitivity. Anxiety sensitivity is an individual difference variable that involves excessive fear of anxiety-related symptoms or bodily sensations. Individuals high in anxiety sensitivity fear anxiety due to their belief that the symptoms are physically, psychologically, or socially harmful (Reiss & McNally, 1985; Reiss, 1991). For example, an individual high in anxiety sensitivity may associate a racing heart rate with a heart attack and fear that he or she is dying. The role of anxiety sensitivity has been largely explored in relation to panic and anxiety disorders (Reiss, Peterson, Gursky, & McNally, 1986; see Taylor, 1999 for a review), including more recently, its implication in SA. To date, research has largely examined the relationship between SA and three dimensions of anxiety sensitivity, namely physical, psychological/cognitive, and social concerns. While research has generally found SA to be most strongly associated with the social concerns dimension of anxiety sensitivity, some inconsistencies have been reported. For instance, Rector, Szacun-Shimizu, and Leybman (2007) found social concerns to be significantly higher among those diagnosed with SAD, while physical and cognitive concerns were highest among those diagnosed with panic and generalized anxiety disorder, respectively. In a subsequent study, Drost, Van der Does, Antypa, Zitman, Dyck, et al. (2012) found both social and cognitive concerns to uniquely predict a diagnosis of SAD.

Researchers have also examined the relationship between anxiety sensitivity and SA among non-clinical samples. In a study of undergraduates, Belcher and Peters (2009) found only physical and cognitive concerns to contribute to unique variance in social fears. In contrast, Grant, Beck, and Davila (2007) found all three dimensions of anxiety sensitivity to be significantly and positively correlated with SA at baseline and one-year follow-up. Notably, however, structural equations modeling showed that no dimensions of anxiety sensitivity at baseline predicted SA one year later. Evidently, while research recognizes the importance of studying the role of anxiety sensitivity in SA, further research may serve to clarify previously inconsistent findings.

### **Social Anxiety and Alcohol Use**

Research in the area of SA has begun exploring the relationship between SA and problematic alcohol use. According to epidemiological research, lifetime prevalence rates for comorbid SAD and alcohol abuse or dependence (collectively referred to as Alcohol Use Disorder (AUD) in the DSM-5), reportedly range from 10.8 – 24.1% in males and 14.3 – 30.3% in females (Kessler, Crum, Warner, Nelson, Schulenberg, et al., 1997). Longitudinal research has shown SAD to increase one's odds of developing alcohol dependence by 4.5 times over a 14-year period, and for this association to be specific to social, but not other anxiety disorders (Buckner, Schmidt, Lange, Small, Schlauch, et al., 2008). Research has also shown a comorbid diagnosis of SAD and AUD to significantly increase individuals' likelihood of suffering from another mental disorder (Schneier, Foose, Hasin, Heimberg, Liu, et al., 2010).

While epidemiological research has continuously reported high rates of comorbidity between SAD and AUD, findings from research with non-clinical samples have been largely inconsistent. (Worth noting, is that while AUDs constitute an extreme form of problematic

drinking, problematic alcohol use may also exist at subclinical levels.) While some studies report problematic drinking to be significantly higher among those with elevated (yet subclinical) levels of SA, others suggest a negative or non-existent relationship (Bruch, Heimberg, Harvey, McCann, Mahone, & Slavkin, 1992; see Morris, Stewart, & Ham, 2005 for a full review). In one study of university students, Kidorf and Lang (1999) had participants consume alcohol during a baseline 30-minute free-drinking period, and again during a free-drinking period preceding a 15-minute speech. The researchers found that those with higher levels of trait SA were significantly more likely to drink more alcohol during the 15-minute period in which they were anticipating the upcoming speech. Alternatively, research by Stewart, Morris, Mellings, and Komar (2006) found frequency of alcohol use to be negatively related to both social avoidance and social distress in a university sample. In another study that examined social evaluation anxiety among undergraduates, Battista and Kocovski (2010) found SA to be negatively related to amount of alcohol consumed during a typical week of drinking, but not during a heavy week of drinking. However, findings also showed that total number of drinks consumed during a social event was positively related to levels of post-event processing three to five days after the event. This research suggests while alcohol consumption may be lower in those with elevated SA, cognitive aspects of SA such as post-event processing appear to be influenced by even minimal alcohol consumption.

Further research supports this notion, with studies showing that despite consuming less alcohol than non-anxious counterparts, socially anxious individuals suffer from more negative consequences as a result of drinking. Negative drinking outcomes, frequently measured using the Rutgers Alcohol Problem Index (White & Labouvie, 1989), include but are not limited to: problems at school, trouble with friends or family, and legal problems. In one study examining

SA and problematic drinking, Buckner and Heimberg (2010) found that while socially anxious and non-anxious individuals did not differ in terms of typical alcohol consumption, highly anxious persons did report experiencing significantly more problems as a result of their drinking. Furthermore, this relationship was mediated by an individual's tendency to drink as a way to cope with SA, as well as to avoid social situations when alcohol was unavailable. In another study, Lewis, Hove, Whiteside, Lee, Kirkeby, et al. (2008) had university students complete measures of SA and alcohol-related problems, and found that although SA was associated with less alcohol consumption, it was positively related to a number of negative alcohol-related problems. On the contrary, Eggleston, Woolaway-Bickel, and Schmidt (2004), found social interaction anxiety to predict lower frequency and quantity of alcohol use, and for the relationship between SA and alcohol-related problems to be non-significant. Such discrepancies may be due, in part, to differences in methodology and the way in which SA was conceptualized. More specifically, Eggleston et al. (2004) assessed social interaction anxiety, Lewis et al. (2008) used a latent variable comprised of three measures, and Buckner and Heimberg (2010) examined social avoidance and distress. A clear understanding of the relationship between SA and problematic drinking therefore warrants recognition of the fact that SA is a multifaceted construct and that differences in measurement may result in different findings.

**Drinking Motives.** In an attempt to further clarify the relationship between SA and problematic drinking, research has sought to determine the particular motives underlying socially anxious individuals' drinking. Largely driving research in this area are motivational models of alcohol use, with one of the most widely supported being Cooper's (1994) four-factor model. Cooper's (1994) model, based on earlier work by Cox and Klinger (1988), identifies two dimensions of reinforcement: valence (positive/negative) and source (internal/external).

According to Cooper (1994), these dimensions intersect to form four possible motives for drinking, which include drinking to: reduce or manage negative affect (negative valence and internal source), reduce the likelihood of social rejection or criticism (negative valence and external source), increase positive feelings or affect (positive valence and internal source), or obtain a positive social reward (positive valence and external source). These motives are commonly referred to as coping, conformity, enhancement, and social motives, respectively. More recently, Blackwell and Conrod (2003) proposed a 5-factor model, in which Cooper's (1994) original coping motive is further divided into depressive and anxious coping.

Research exploring drinking among socially anxious individuals has repeatedly found that socially anxious individuals endorse more negative reinforcement drinking patterns. For instance, in an 11-year longitudinal study, Windle and Windle (2012) examined the relationship between clinically significant SA and coping, social and enhancement motives for drinking. Findings revealed that from early to middle-young adulthood, a diagnosis of SAD predicted coping but not enhancement or social motives for drinking. Similarly, in a community study of adolescent drinkers, symptoms of SA were positively associated with coping motives, but unrelated to enhancement, social and conformity motives (Blumenthal, Leen-Feldner, Frala, Badour, & Ham, 2010). Additionally, Blumenthal et al. (2010) found enhancement and social motives to be positively associated with drinking frequency, but for drinking motives not to moderate the relationship between SA and frequency of alcohol use.

Additional research has also examined the relationship between drinking motives and negative consequences that individuals experience as a result of alcohol consumption (commonly referred to as alcohol-related problems). For instance, in a study of college drinkers, Ham, Zamboanga, Bacon, and Garcia (2009) found that SA was associated with all four motives for

drinking, but that SA had indirect effects on alcohol-related problems and symptoms of dependence only through coping motives. Similarly, early research by Turner, Beidel, Dancu, and Keys (1986) found that 50% of individuals diagnosed with DSM-III SAD reported consuming alcohol prior to social interactions or public speaking as a means of reducing their anticipatory anxiety. Additional research by Stewart et al. (2006) has provided partial support for these findings, with results showing both coping and conformity motives to mediate the relationship between fear of negative evaluation (a core fear in those with SA) and alcohol-related problems among undergraduates. On the contrary, undergraduate research by Buckner, Eggleston, and Schmidt (2006) has found social interaction anxiety to be positively correlated only with enhancement motives, and for enhancement motives to significantly mediate the relationship between social interaction anxiety and alcohol-related problems. Clearly, while motives for drinking are an important factor to consider while examining the relationship between SA and problematic drinking, previous findings are inconsistent and more research is warranted.

### **Alcohol Use and Anxiety Sensitivity**

Another factor that has received increasing attention in regards to problematic drinking is anxiety sensitivity. More specifically, it has been proposed that those with higher levels of anxiety sensitivity may in fact experience a hypersensitivity to the anxiolytic effects of alcohol. As a result, these individuals may find alcohol particularly effective at reducing their anxiety and continue to engage in patterns of negative reinforcement drinking as a result (Pihl & Peterson, 1995). Interestingly, research involving clinical samples appears to support this notion. For instance, in a two-year longitudinal study involving high-risk 16-24 year-olds, Schmidt, Buckner, and Keough (2007) found anxiety sensitivity to positively predict future development



of an AUD after accounting for AUD history. Research has also demonstrated relationships between anxiety sensitivity and coping and conformity motives for drinking. More specifically, Howell, Leyro, Hogan, Buckner, and Zvolensky (2010) have found anxiety sensitivity to be significantly positively associated with conformity motives for drinking, as well as a significant predictor of alcohol use problems. In addition, research with alcohol dependent individuals has shown anxiety sensitivity to be positively associated with drinking to cope with feelings of anxiety and negative affect (Kushner, Thuras, Abrams, Brekke, & Stritar, 2001). Interestingly, findings by Kushner et al. (2001) also found that these relationships were mediated by various measures of anxiety, including levels of SA.

In addition to research with clinical samples, researchers have sought to explore the association between anxiety sensitivity and problematic drinking among non-clinical young adults. For instance, research by Samoluk and Stewart (1998) examined the situations in which undergraduates high (versus low) in anxiety sensitivity were most likely to consume alcohol. Findings showed that higher levels of anxiety sensitivity were associated with negatively reinforcing drinking situations in which participants experienced conflict with others, unpleasant emotions, or physical discomfort. In addition, anxiety sensitivity was associated with temptation situations in individuals attempted to test their personal control. In an attempt to extend this research, Harwell, Cellucci, and Iwata (2011) examined how each dimension of anxiety sensitivity (i.e., physical concerns, cognitive dyscontrol, and social concerns) and anxious rumination were associated with negative reinforcement drinking. Findings showed that anxiety sensitivity was positively associated with negative reinforcement drinking, and that cognitive concerns was the only dimension that uniquely predicted negative reinforcement drinking. Most notably, the researchers found that rumination mediated the relationship between anxiety

sensitivity and negative reinforcement drinking. Given that rumination is one of many factors proposed to play a role in maintaining SA, it is also possible that other SA-maintaining factors serve to mediate this relationship as well.

### **Current Study**

Research to date has largely supported the notion that those with elevated yet subclinical levels of SA experience an increase in alcohol-related problems, despite a general tendency to consume less alcohol than non-anxious counterparts (see Morris et al., 2005 for a full review). Research attempting to resolve this paradox has often found that socially anxious individuals report more negative reinforcement drinking patterns, namely drinking to cope and/or to conform (Stewart et al., 2006; Blumenthal et al., 2010; Windle & Windle, 2012). Furthermore, research has shown negative drinking motives to mediate the relationship between SA and alcohol-related problems (Stewart et al., 2006; Lewis et al., 2008).

Additional research has demonstrated relationships among negative drinking motives, alcohol-related problems and anxiety sensitivity (Samoluk & Stewart, 1998; Howell et al., 2010; Harwell et al., 2011). In one study, Harwell et al. (2011) found anxiety sensitivity to indirectly predict negative reinforcement drinking through engagement in anxious rumination. Given that rumination serves to maintain SA, these findings point to the possibility that relationships also exist between negative reinforcement drinking and other SA- maintaining factors, such as post-event processing, anticipatory processing, self-focused attention and in-situ safety behaviours. Furthermore, while research has demonstrated a positive association between SA and anxiety sensitivity (Belcher & Peters, 2009; Drost et al., 2012; Grant et al., 2007; Rector et al., 2007), further research is warranted to clarify how SA is related to each dimension of anxiety sensitivity in non-clinical samples.

The current study therefore served to clarify the relationships between social anxiety, problematic drinking and anxiety sensitivity among undergraduates. More specifically, the study examined the relationships among a number of drinking variables (i.e., drinking motives, consumption, and consequences) and factors known to contribute to the maintenance of SA (i.e., rumination, post-event processing, anticipatory processing, self-focused attention, and safety behaviours). It also served to clarify the relationship between SA and anxiety sensitivity. In doing so, SA was conceptualized as a multidimensional, construct comprised of: social interaction, evaluation, and public speaking anxiety. Importantly, these types of SA were distinguished from the cognitive and behavioural processes commonly associated with SA (i.e., fear of negative evaluation and social avoidance). The study's hypotheses were as follows:

1. There would be positive correlations between SA, SA-maintaining factors (i.e., rumination, post-event processing, anticipatory processing, self-focused attention, safety behaviours), anxiety sensitivity, negative drinking motives (i.e., coping and conformity), and alcohol-related problems. Alternatively, there would be negative relationships between SA and quantity/frequency of alcohol consumption, as well as between SA-maintaining factors and quantity/frequency of alcohol consumption.
2. In line with prior research (Harwell et al., 2010), rumination would mediate the relationship between anxiety sensitivity and negative drinking motives (i.e., coping and conformity). Given that anticipatory and post-event processing are also forms of repetitive negative thinking, and that self-focused attention is a core feature of repetitive negative thought, these factors were also expected to mediate the relationship between anxiety sensitivity and negative drinking motives. Exploratory analyses were conducted to determine whether in-situ safety behaviours also mediated this relationship.

3. Negative drinking motives would mediate the relationship between SA and alcohol-related problems. Negative drinking motives would also mediate the relationship between each SA-maintaining factor (i.e., rumination, post-event processing, anticipatory processing, self-focused attention, and safety behaviours) and alcohol-related problems.

## Method

### Participants

Participants consisted of male and female undergraduate students who were recruited through Lakehead University's introductory psychology research pool (21 participants did not report on their sex). Given that completion of the Modified Drinking Motives Questionnaire – Revised (Blackwell & Conrod, 2003) requires respondents to have consumed alcohol at least once in the past year, individuals who reported otherwise were deemed ineligible to participate. No other eligibility criteria existed. Participation was voluntary and individuals were compensated with 1.0 bonus points for course credit.

### Measures

**Primary measures.** Primary measures were used to test the study's main hypotheses and included measures of: SA, rumination, post-event processing, anticipatory processing, self-focused attention, safety behaviours, anxiety sensitivity, alcohol use (quantity/frequency), drinking motives and alcohol-related problems.

***Social Interaction Anxiety Scale (SIAS) and Social Phobia Scale (SPS).*** The Social Interaction Anxiety Scale and the Social Phobia Scale (SIAS; SPS; Mattick & Clark, 1998) (see Appendices A and B) were used to measure anxiety for social interaction and evaluation situations, respectively. These measures were developed together and are comprised of 20 self-report items that have individuals rate how true, from 0 (not at all) to 4 (extremely), each

statement is of him or her. Total scores range from 0 to 80, with higher scores reflecting higher levels of social anxiety. Initial construction and validation of the SIAS and SPS showed both measures to have good to excellent internal consistency in clinical and control samples (Cronbach's  $\alpha = .88$  to  $.94$ ), as well as in clinically socially anxious samples (Cronbach's  $\alpha = .89$  to  $.93$ ). Test-retest reliabilities were high, with correlations of  $.92$  on the SIAS and  $.91$  to  $.93$  on the SPS after approximately four and 12-week intervals. Discriminant validity was also high, with both measures capable of discriminating between clinically socially anxious individuals and healthy controls ( $p < .001$ ), as well as between SA, agoraphobia, and simple phobia ( $p$ -values ranging from  $< .05$  to  $< .001$ ) (Mattick & Clark, 1998). In the present study, internal consistency was excellent (Cronbach's  $\alpha = .92$  on the SIAS and  $.95$  on the SPS).

***Short Personal Report of Confidence as a Speaker Scale (PRCS).*** Public speaking anxiety was assessed using the Short Personal Report of Confidence as a Speaker Scale (see Appendix C) (PRCS-S-12; Hook, Smith, & Valentiner, 2008). The PRCS-S-12 is a shortened, version of the original 104-item PRCS (Gilkinson, 1942), and the subsequently developed 30-item PRCS (Paul, 1966). The PRCS-S-12 is a 12-item self-report measure that asks respondents to indicate whether each statement is "true" or "false". Total scores range from 0 to 12, with higher scores reflecting higher levels of public speaking anxiety. Both the original and shortened versions of the PRCS have been shown to have good to high internal consistency (Cronbach's  $\alpha = .91$  and  $.85$ , respectively). The PRCS-S-12 has also demonstrated high convergent validity with other measures of SA and shyness ( $r$ s ranging from  $.15$  to  $.54$ ), and high divergent validity from measures of sociability ( $r = -.11$ ). In the present study, internal consistency was good (Cronbach's  $\alpha = .84$ ).

***Rumination Reflection Questionnaire – Rumination (RRQ-Rum).*** Tendency to engage

in anxious rumination was measured with the Rumination subscale of the Rumination Reflection Questionnaire (see Appendix D) (RRQ-Rum; Trapnell & Campbell, 1999). The RRQ-Rum is a 12-item self-report measure that asks respondents to indicate how strongly, from 1 (strongly agree) to 5 (strongly disagree), they agree with statements regarding their tendency to engage in prolonged rumination. For example, Item 5 states, "I tend to "ruminate" or dwell over things that happen to me for a really long time afterward". Items 6, 9 and 10 are reversed score, which results in a total possible score of 45. Higher scores indicate a higher tendency to ruminate. Trapnell and Campbell (1999) demonstrated the RRQ-Rum to have high internal consistency (Cronbach's  $\alpha = .90$ ) and to be distinctively separate from general tendency to self-reflect, with correlations of only .22 with the RRQ-Reflection subscale. In the present study, internal consistency was excellent (Cronbach's  $\alpha = .92$ ).

*Social Anxiety Rumination Questionnaire – Trait (SARQ-T)*. The SARQ-T is a 29-item self-report measure that was used to assess participants' tendency to engage in post-event processing following any type of social event (see Appendix E) (SARQ-T; Blackie & Kocovski, unpublished). Contrary to the RRQ-Rum, this measure assessed rumination specifically in response to a social event. The SARQ-T has respondents rate how strongly, from 1 (strong agree) to 5 (strongly disagree), they agree with each statement. It includes 17 revised items taken from pre-existing questionnaires (i.e., Thoughts Questionnaire (Edwards et al., 2003), Post-event Processing Questionnaire-Revised (Fehm, Hoyer, Schneider, Lindermann, & Klusmann, 2008), Rumination-Reflection Questionnaire – Rumination Subscale (Trapnell & Campbell, 1999), and Rumination Questionnaire (Mellings & Alden, 2000)), as well as 12 original items. Preliminary testing on non-anxious and socially anxious undergraduates showed the SARQ-T to have mostly moderate to strong concurrent validity, with correlations of .39 to .74 with other measures of

rumination and post-event processing. The SARQ-T has also been shown to discriminate between ruminative and self-reflective thoughts, with correlations of .74 existing with the Rumination subscale and only .02 with the Reflection subscale of the RRQ. In the present study, internal consistency was excellent (Cronbach's  $\alpha = .96$ ).

***Anticipatory Social Behaviours Questionnaire (ASBQ).*** Tendency to engage in anticipatory processing was measured using the ASBQ (see Appendix F) (ASBQ; Hinrichsen & Clark, 2003). The ASBQ is a 12-item self-report questionnaire that was developed based on original items from the Social Behaviours Questionnaire (SBQ; Clark, Butler, Fennell, Hackmann, & McManus, 1995). The ASBQ has respondents indicate how often, from 1 (never) to 4 (always), they engage in anticipatory processing prior to a social situation. Research has shown the ASBQ to have good internal consistency (Cronbach's  $\alpha = .87 - .88$ ) and to discriminate between undergraduates high versus low in SA ( $p$ -values ranging from  $< .05$  to  $< .001$  on 11 of 12 items) (Hinrichsen & Clark, 2003; Mills, Lechner, & Judah, 2013). In the present study, internal consistency was excellent (Cronbach's  $\alpha = .94$ ).

***Trait Self-focused Attention Questionnaire (TSFAQ).*** Tendency to engage in self-focused attention was measured using the TSFAQ (see Appendix G). The TSFAQ is a 16-item self-report questionnaire that was developed using items from Bögels, Alberts, & de Jong's (1996) Self-focused Attention Scale (SFAS) and the self-focused subscale of Woody's (1996) Focus of Attention Questionnaire (FAQ) (see Appendix E). Participants are asked to rate, from 0 (not at all) to 4 (extremely), how often they focus on various self-relevant aspects of a social situation. For example, items address concerns such as whether one is "blushing, trembling, or sweating", as well as whether one is "behaving appropriately". Higher TSFAQ scores reflect greater trait tendency to engage in self-focused attention. Prior research (Gaydukevych &

Kocovski, 2012) has shown the TSFAQ to have good internal consistency among socially anxious undergraduates (Cronbach's  $\alpha = .88$ ), and internal consistency was excellent in the present study (Cronbach's  $\alpha = .96$ ).

***Social Phobia Safety Behaviour Scale (SPSBS).*** Tendency to engage in in-situ safety behaviours was measured using the Social Phobia Safety Behaviour Scale (see Appendix H) (SPSBS; Pinto-Gouveia, Cunha, & do Céu Salvador, 2003). The SPSBS has respondents indicate how frequently, from 1 (never) to 4 (usually), they engage in specified safety behaviour during social situations. For instance, items include statements such as “putting your hands in your pockets”, and “getting a seat as hidden as you can”. The SPSBS has demonstrated good internal consistency, with Cronbach's alphas of .82 in a clinically socially anxious sample, .87 in a sample of individuals with other anxiety disorders, and .82 in a sample of normal controls (Pinto-Gouveia, Cunha, & do Céu Salvador, 2003). Internal consistency was excellent in the present study (Cronbach's  $\alpha = .93$ ).

***Anxiety Sensitivity Index - 3 (ASI-3).*** Anxiety sensitivity was measured using the Anxiety Sensitivity Index - 3 (see Appendix I), which is an adapted version of the original Anxiety Sensitivity Index (ASI-3; Taylor, Cox, Deacon, Heimberg, Ledley, et al., 2007; ASI; Reiss, Peterson, Gursky, & McNally, 1986). The ASI-3 is an 18-item self-report questionnaire that asks respondents to indicate, from 0 (very little) to 4 (very much), the degree to which they experience a variety of negative consequences in response to anxiety. Contrary to the original ASI, the ASI-3 was developed as a multidimensional measure, comprised of three subscales: physical, cognitive, and social concerns. For example, Item 6 (“It scares me when my heart beats rapidly”) reflects physical concerns, Item 2 (“When I cannot keep my mind on a task, I worry that I might be going crazy”) reflects cognitive concerns, and Item 13 (“Other people notice



when I feel shaky”) reflects social concerns. The ASI-3’s psychometric properties have been assessed across various clinical and non-clinical samples in Canada, the United States, France, Mexico, the Netherlands, and Spain. Internal consistencies have been found to be acceptable to excellent among clinical (Cronbach’s  $\alpha = .86$  to  $.91$  on each subscale) and non-clinical samples (Cronbach’s  $\alpha = .73$  to  $.87$ ). Findings also showed good convergent validity, with all three subscales being highly correlated with each other and with similar items on the original ASI (Taylor et al., 2007). In the present study, internal consistencies were good to excellent, with a total Cronbach’s alpha of  $.93$ ,  $.86$  on the physical concerns subscale,  $.90$  on the cognitive concerns subscale, and  $.80$  on the social concerns subscale.

***Alcohol Use Questionnaire (AUQ).*** Level and pattern of alcohol consumption were measured using the 3-item question set provided by the Task Force on Recommended Alcohol Questions (see Appendix J) (AUQ; National Institute on Alcohol Abuse and Alcoholism, 2003). These questions were designed to provide researchers with the minimum number of alcohol-related questions necessary to accurately assess drinking behaviours and patterns. This measure was also used as a screening measure to ensure that participants had consumed alcohol at least once in the past year.

***Modified Drinking Motives Questionnaire – Revised (M-DMQ-R).*** Participants’ drinking motives were assessed using the Modified Drinking Motives Questionnaire – Revised (see Appendix K) (Modified DMQ-R; Blackwell & Conrod, 2003, unpublished). The M-DMQ-R was developed based on Cooper’s (1994) earlier Drinking Motives Questionnaire – Revised (DMQ-R; Cooper, 1994). Similar to the original version, the M-DMQ-R asks respondents to indicate how often, from 1 (never/almost never) to 5 (always/almost always), they consume alcohol for various reasons. While the original DMQ-R was based on Cooper’s (1994) 4-factor

solution, the M-DMQ-R is based on a 5-factor solution proposed by Blackwell and Conrod (2003). It contains 28 items that are grouped into five motives for alcohol use, which include: Social, Coping – Anxiety, Coping – Depression, Enhancement, and Conformity Motives. Research evaluating the factor structure of the M-DMQ-R found support for a 5-factor solution using confirmatory factor analysis (Grant, Stewart, O'Connor, Blackwell, & Conrod, 2007). The M-DMQ-R was also found to have good to excellent test-retest reliability (intraclass correlation coefficients ranging from .61 to .78), as well as primarily acceptable to excellent internal consistency (Cronbach's  $\alpha = .58$  to .91). Internal consistency in the present study was acceptable to excellent for each factor, with Cronbach's alphas ranging from .74 to .94.

***Rutgers Alcohol Problem Index (RAPI).*** Alcohol-related problems were measured using the Rutgers Alcohol Problem Index (see Appendix L) (RAPI; White & Labouvie, 1989). The RAPI is a 23-item self-report questionnaire that asks respondents to indicate how often, from 0 (never) to 4 (greater than 10 times), they have experienced a number of alcohol-related problems in the last year. Total scores range from 0 to 92, with higher scores reflecting greater tendency to experience alcohol-related problems such as school (failure to do homework or study for a test) and/or health-related problems (passing out or fainting). Research has showed the RAPI to have excellent internal consistency (Cronbach's  $\alpha = .84$  to .92) and to discriminate well between 12, 15, 18, and 21-year olds (Battista et al., 2012; White & Labouvie, 1989). Internal consistency in the present study was excellent (Cronbach's  $\alpha = .94$ ).

**Secondary measures.** Secondary measures were used to collect demographic information, and assess general repetitive negative thinking, social avoidance and depressive symptoms.

***Demographic Questionnaire.*** A demographics questionnaire was included to assess each

participant's age, biological sex, education, occupation, and marital status (see Appendix M).

***Repetitive Negative Thinking scale (RNT)***. Tendency to engage in any general repetitive negative thinking was assessed using the Repetitive Negative Thinking subscale of the Repetitive Thinking Questionnaire (see Appendix N) (RTQ-RNT; McEvoy, Mahoney, & Moulds, 2010). The RTQ is a 31-item self-report measure that was designed using items from the Ruminative Response Scale of the Response Styles Questionnaire (RRS; Nolen-Hoeksema & Morrow, 1991), the Penn State Worry Questionnaire (PSWQ; Meyer, Miller, Metzger, & Borkovec, 1990), and the Post-Event Processing Questionnaire – Revised (PEPQ-R; McEvoy & Kingsep, 2006). It consists of two subscales, which assess repetitive negative thinking (RNT) and absence of repetitive thought (ART). In the present study, only the former subscale was used.

Respondents are instructed to “think about the last time [they] felt especially upset or distressed”, and to rate, from 1 (not true at all) to 5 (very true), how true each statement is regarding their experience following the situation. Total scores on the RNT subscale range from 0 to 135, with higher scores reflecting a greater tendency to engage in repetitive negative thinking. Research has showed the RNT subscale to have good to excellent internal consistency (Cronbach's  $\alpha = .88$  to  $.93$ ) (McEvoy et al., 2010; McEvoy, Mahoney, & Moulds, 2012), and internal consistency was also excellent in the present study (Cronbach's  $\alpha = .97$ ).

***Liebowitz Social Anxiety Scale – Self-Report – Social Avoidance Subscale (LSAS-SR-SA)***. Social avoidance was measured using the Social Avoidance subscale of the Liebowitz Social Anxiety Scale self-report version (see Appendix O) (LSAS-SR; Liebowitz, 1987). The LSAS-SR-SA was used to assess whether socially anxious individuals reported less alcohol consumption simply due to their tendency to avoid situations in which alcohol may be available (e.g., a party or social gathering). The Social Avoidance subscale assesses respondents'

tendency, from 0 – never (0%) to 3 – severe (68 – 100%), to avoid social interactions and/or performance situations over the last week, with higher scores reflecting greater social avoidance. Research has shown the LSAS-SR to have acceptable to good internal consistency among clinically socially anxious individuals (Cronbach's  $\alpha = .83$  to  $.84$ ) as well as healthy controls (Cronbach's  $\alpha = .78$  to  $.84$ ) (Fresco, Coles, Heimberg, Liebowitz, Hami, et al., 2001). Research has also shown 12-week test-retest reliability be high among clinically socially anxious individuals (total Social Avoidance subscale correlation of  $.83$ ) (Baker, Heinrichs, Kim, & Hofmann, 2002), and for a computer-administered version of the LSAS to correlate strongly with the clinician-administered version ( $r = .89$ ) (Katzelnick, Kobak, Greist, Jefferson, Mantle, & Serlin, 1995b). In the present study, internal consistency was high (Cronbach's  $\alpha = .92$ ).

***Depression Anxiety Stress Scale – 21 (DASS-21).*** Given the potential comorbidity between depression and SA, depressive symptoms were assessed using the Depression subscale of the short version of the Depression Anxiety Stress Scale (see Appendix P) (DASS-21; Lovibond & Lovibond, 1995). The DASS-21 is a 21-item version of the original 42-item DASS. It is comprised of three seven-item subscales designed to measure overall levels of depression, anxiety and stress. Respondents are asked to indicate, from 0 to 3, the extent to which they have experienced each emotional state during the last week. Final scores range from 0 to 21, with higher scores reflecting more severe or frequent depression/anxiety/stress. Research (Antony, Bieling, Cox, Enns, & Swinson, 1998) has shown the Depression subscale to have excellent internal consistency in clinical and non-clinical samples (Cronbach's  $\alpha = .94$ ), and to differentiate between various clinical groups (i.e., Major Depressive Disorder, Panic Disorder, Obsessive Compulsive Disorder, Social Anxiety Disorder, and Specific Phobia). In the present study, internal consistency of the Depression subscale was excellent (Cronbach's  $\alpha = .90$ ).

## Procedure

Interested participants were provided with a link to SurveyMonkey.com where they completed all study measures. Prior to beginning, participants read an information letter (see Appendix Q) and then provided informed consent (see Appendix Q). Participants first completed the Alcohol Use Questionnaire (see Appendix J), which was used as a screening measure to ensure study eligibility (i.e., respondents must have consumed alcohol at least once in the past 12 months). Ineligible participants were not permitted to continue. In order to prevent the likelihood of order effects, all remaining measures were presented in a randomized order using SurveyMonkey's online randomizer tool. Upon study completion, participants were fully debriefed via an online debriefing form (see Appendix R) and subsequently compensated with course credit.

## Analyses

**Pearson product moment correlations.** A series of bivariate Pearson Product Moment Correlations were conducted to test the study's first hypothesis. Pearson correlations analyze the strength and direction of a linear relationship between two variables, with possible values ranging from 0 to  $\pm 1$ . The closer a value is to 1, the stronger the correlation. A Bonferonni correction was used to account for multiple comparisons, thereby setting alpha at  $p < .001$  for all correlational analyses.

**Multiple mediation analyses.** The remaining hypotheses were tested using multiple mediation analyses. We employed a non-parametric bootstrapping approach to mediation, which has recently been recommended over more traditional approaches such as Baron and Kenny's (1986) *causal steps* and Sobel's (1982; 1986) *product-of-coefficient* approaches (Preacher & Hayes, 2008). As discussed by Preacher and Hayes (2008), bootstrapping has many benefits over

other approaches, including the fact that the assumption of normality does not need to be met, it does not require sample sizes as large as those needed for the Sobel (1982; 1986) method, and it allows for higher power without increasing rates of Type I error.

As discussed in the literature (Preacher & Hayes, 2008; and Hayes, 2013 for reviews), the bootstrapping approach employs random sampling with replacement to produce thousands of bootstrapped samples from an original dataset. Ninety-five percent confidence intervals are then generated and examined to determine whether the indirect effects of interest are significant. If zero is contained within the lower and upper boundaries of the confidence interval, one can conclude that an indirect effect is non-significant and that mediation does not exist. By using the bootstrapping approach to test for multiple mediation, one is able to determine whether there are significant *total* and *specific* indirect effects of a predictor variable ( $X$ ) on an outcome variable ( $Y$ ), through various mediating variables ( $M_1, M_2...M_k$ ). When a *specific* indirect effect is significant, one can conclude that  $X$  has an indirect effect on  $Y$  through a certain mediator (e.g.,  $M_1$ ), while controlling for all other mediators in the model (e.g.,  $M_2...M_k$ ). When a *total* indirect effect proves significant, one can conclude that  $X$  has an indirect effect on  $Y$  through all mediators in the model. In the current study, analyses were conducted using model 4 of the process macro for SPSS (see Hayes, 2013).

## Results

A total of 211 participants comprised the initial sample. After data screening (described below) the final adjusted sample ( $N = 180$ ) consisted of 35 males and 145 females with a mean age of 20.36 ( $SD = 3.70$ ). The majority of participants were Caucasian (88.9%) and single (86.1%).

### Data Screening

**Missing data.** 31 participants were missing complete data for at least one study measure. Analyses revealed that these participants did not differ significantly on any of the study's primary measures and data from these participants were therefore excluded.

Of the remaining participants ( $N = 180$ ), 75 were identified as having at least one missing item. The overall proportion of missing data was small, with all but six measures missing less than 5% of data (see Table 1). Little's (1998) Missing Completely At Random (MCAR) test revealed that data were MCAR on all but three variables (i.e., anticipatory processing, social avoidance, and depressive coping motives), with only social avoidance missing more than 5% (see Table 1) (As discussed below, this variable was not included in any of the final analyses). Missing values were therefore imputed using the expectation maximization method.

**Outliers.** Outliers were defined as scores with z-scores of  $\pm 3.29$  standard deviations from the mean. A total of 16 values were identified as possible outliers and their values were reduced to the next non-outlier number plus one. Final means and standard deviations for primary and secondary measures are presented in Table 1.

**Linearity and normality.** Linearity and normality are assumptions for Pearson's correlations. Several distributions were positively skewed: alcohol-related problems, the physical and cognitive concerns dimensions of anxiety sensitivity, and depressive coping and conformity motives (skewness = 6.27 to 9.63). After applying log, square root and reciprocal transformations, it was determined that log transformations resulted in the best normality for all variables (skewness = - 0.51 to 5.35). These transformed variables were used when conducting Pearson's correlations (Hypothesis 1).

**Covariates.** Biological sex, social avoidance and depressive symptoms were examined as possible covariates, with a Bonferroni correction used due to the number of comparisons.

Table 1

*Means, Standard Deviations, Cronbach's Alphas and % of Missing Data (n = 180)*

	<i>M</i>	<i>SD</i>	<i>α</i>	Missing Data (%)
<u>Primary measures</u>				
SIAS	27.56	14.20	.92	4.4
SPS	18.93	15.08	.95	2.2
PRCS	6.24	3.39	.84	0.6
RRQ-rum	39.91	10.21	.92	4.4
SARQ-T	77.90	23.00	.96	11.7
ASBQ	27.68	8.56	.94	0
TSFAQ	21.62	15.20	.96	6.1
SPSBS	33.29	9.97	.93	2.2
ASI-3 total	17.13	13.64	.93	7.8
ASI-3 physical concerns	4.77	5.12	.86	1.1
ASI-3 cognitive concerns	4.05	4.99	.90	3.9
ASI-3 social concerns	8.33	5.39	.80	3.3
AUQ average frequency	6.32	1.69	–	0
AUQ average quantity	3.70	1.68	–	0
AUQ binge frequency	3.48	1.86	–	0
M-DMQ-R anxious coping motives	8.25	3.41	.74	0.6
M-DMQ-R depressive coping motives	15.30	7.46	.94	2.8
M-DMQ-R conformity motives	7.87	3.79	.86	0.6
M-DMQ-R enhancement motives	12.71	5.02	.87	3.3
M-DMQ-R social motives	15.27	4.19	.76	1.7
RAPI	8.59	9.98	.94	7.2
<u>Secondary measures</u>				
RNT	70.37	26.37	.97	8.3
LSAS-SR-SA	23.46	12.30	.92	6.1
DASS-21 depression	4.50	4.68	.90	2.8

*Note.* SIAS = Social Interaction Anxiety Scale, SPS = Social Phobia Scale, PRCS = Short Report of Personal Confidence as a Speaker Scale, RRQ-rum = Rumination Reflection Questionnaire – Rumination, SARQ-T = Social Anxiety Rumination Questionnaire - Trait, ASBQ = Anticipatory Social Behaviours Questionnaire, SPSBS = Social Phobia Safety Behaviours Questionnaire, ASI-3 = Anxiety Sensitivity Index-3, AUQ = Alcohol Use Questionnaire, M-DMQ-R = Modified Drinking Motives Questionnaire, RTQ = Repetitive Negative Thinking scale, LSAS-SR-SA = Liebowitz Social Anxiety Scale – Self-Report – Social Avoidance Subscale, DASS-21 = Depression Anxiety Stress Scale – 21.



Analyses revealed no significant group differences between males and females on any study measures; sex was therefore excluded as a covariate. Analyses did not reveal significant correlations between social avoidance and frequency of alcohol consumption, thereby eliminating these variables as possible covariates. Finally, analyses revealed significant positive associations between depressive symptoms and social interaction ( $r(178) = .44, p < .001$ ), evaluation ( $r(178) = .50, p < .001$ ), and public speaking anxiety ( $r(178) = .39, p < .001$ ). Given that SA often co-occurs with depression (Kessler, Stang, Wittchen, Stein, & Walters, 1999; Brown, Campbell, Lehman, Grisham, & Mancill, 2001), it was decided that controlling for depressive symptoms would eliminate a significant amount of shared variance with SA, as well as threaten the external validity of our findings. Depressive symptoms were therefore not controlled for in the study analyses.

### **Hypothesis One: Relationships Among Study Variables**

Our first hypothesis predicted that significant positive correlations would emerge between SA, SA-maintaining factors, anxiety sensitivity, negative drinking motives and alcohol-related problems. It was also hypothesized that SA and SA-maintaining factors would be significantly negatively associated with quantity and frequency of alcohol consumption.

**SA, SA-maintaining factors, and anxiety sensitivity.** As hypothesized, all types of SA were significantly positively correlated with rumination, post-event processing, anticipatory processing, self-focused attention and safety behaviours. SA was also significantly positively correlated with general repetitive negative thought. Findings showed that each type of SA and all SA-maintaining factors were significantly positively correlated with anxiety sensitivity (see Table 2). As seen in Table 2, all subtypes of SA and each SA-maintaining factor were most strongly correlated with the social concerns dimension of anxiety sensitivity.

Table 2

*Correlations Between SA, SA-Maintaining Factors, and Anxiety Sensitivity (AS)*

Study variable	1	2	3	4	5	6	7	8	9	10	11	12
1. Interaction anxiety	-	-	-	-	-	-	-	-	-	-	-	-
2. Observation anxiety	.72*	-	-	-	-	-	-	-	-	-	-	-
3. Public speaking anxiety	.50*	.52*	-	-	-	-	-	-	-	-	-	-
4. Rumination	.57*	.53*	.46*	-	-	-	-	-	-	-	-	-
5. Post-event processing	.54*	.56*	.31*	.72*	-	-	-	-	-	-	-	-
6. Anticipatory processing	.48*	.53*	.37*	.60*	.62*	-	-	-	-	-	-	-
7. Self-focused attention	.58*	.68*	.33*	.55*	.57*	.55*	-	-	-	-	-	-
8. Safety behaviours	.75*	.74*	.52*	.58*	.52*	.57*	.61*	-	-	-	-	-
9. Anxiety sensitivity (total)	.57*	.67*	.41*	.50*	.48*	.54*	.68*	.63*	-	-	-	-
10. AS - Physical concerns	.42*	.53*	.29*	.43*	.42*	.47*	.56*	.48*	.83*	-	-	-
11. AS - Cognitive concerns	.52*	.58*	.29*	.41*	.44*	.47*	.58*	.52*	.84*	.65*	-	-
12. AS - Social concerns	.58*	.66*	.48*	.54*	.48*	.52*	.66*	.64*	.88*	.64*	.66*	-
13. Repetitive negative thought	.42*	.48*	.40*	.65*	.53*	.61*	.51*	.52*	.55*	.49*	.48*	.53*

*Note.*  $N = 180$  for all correlations. \*  $p < .001$  (two-tailed). Values for physical and cognitive concerns are based on log transformations. Repetitive negative thought was included only as a secondary measure.

**SA and alcohol-related variables.** Table 3 displays correlations between SA and alcohol-related study variables. As hypothesized, social interaction and evaluation anxiety were significantly positively associated with anxious coping, depressive coping and conformity motives. Alternatively, public speaking anxiety was not significantly correlated with depressive coping or conformity motives. Social evaluation anxiety was the only type of SA that was significantly positively correlated with alcohol-related problems. Contrary to the hypothesis, no types of SA were significantly correlated with frequency or quantity of alcohol consumption (see Table 3).

**SA-maintaining factors and alcohol-related variables.** As hypothesized, all SA-maintaining factors were significantly positively correlated with anxious and depressive coping motives. Rumination was the only SA-maintaining factor that was not significantly correlated with conformity motives. While anticipatory processing, self-focused attention, safety behaviours and general repetitive negative thinking were significantly positively correlated with alcohol-related problems, rumination and post-event processing were not. Contrary to the hypothesis, none of the SA-maintaining factors were significantly correlated with quantity or frequency of alcohol consumption. Findings also showed that anticipatory processing, self-focused attention and repetitive negative thinking were significantly positively correlated with social, but not enhancement motives (see Table 4).

**Anxiety sensitivity and alcohol-related variables.** As hypothesized, anxiety sensitivity was significantly positively correlated with negative drinking motives and alcohol-related problems. As seen in Table 5, similar results were found for each dimension of anxiety sensitivity. Contrary to hypothesis, anxiety sensitivity and all of its dimensions were not significantly correlated with frequency or quantity of alcohol consumption. In addition,

Table 3

*Correlations Between SA and Alcohol-Related Variables*

Variable	1	2	3	4	5	6	7	8	9	10	11
1. Interaction anxiety	–	–	–	–	–	–	–	–	–	–	–
2. Evaluation anxiety	.72*	–	–	–	–	–	–	–	–	–	–
3. Public speaking anxiety	.50*	.52*	–	–	–	–	–	–	–	–	–
4. Anxious coping motives	.33*	.38*	.29*	–	–	–	–	–	–	–	–
5. Depressive coping motives	.28*	.37*	.23	.79*	–	–	–	–	–	–	–
6. Conformity motives	.34*	.36*	.17	.58*	.62*	–	–	–	–	–	–
7. Enhancement motives	.05	.01	.00	.02	.03	.07	–	–	–	–	–
8. Social motives	.08	.15	.19	.55*	.45*	.35*	-.01	–	–	–	–
9. Alcohol frequency	-.05	.08	.03	.32*	.25	.06	-.02	.23	–	–	–
10. Alcohol quantity	.06	.13	.03	.35*	.33*	.11	-.11	.29	.36*	–	–
11. Binge drinking frequency	-.04	.06	.00	.37*	.37*	.20	-.06	.30*	.69*	.48*	–
12. Alcohol-related problems	.22	.32*	.25	.51*	.55*	.37*	-.03	.35*	.35*	.42*	.52*

*Note.*  $N = 180$  for all correlations. \*\*\*  $p < .001$  (two-tailed). Values for depressive coping motives, conformity motives, and alcohol-related problems are based on log transformations.

Table 4

*Correlations Between SA-Maintaining Factors and Alcohol-Related Variables*

Alcohol-related variable	Rumination	Post-event processing	Anticipatory processing	Self-focused attention	Safety behaviours	Repetitive negative thought
Anxious coping motives	.33*	.28*	.44*	.44*	.43*	.40*
Depressive coping motives	.29*	.33*	.39*	.42*	.40*	.41*
Conformity motives	.23	.35*	.39*	.37*	.40*	.26*
Enhancement motives	.02	.07	.05	.02	.03	.02
Social motives	.23	.12	.34*	.30*	.22	.27*
Alcohol frequency	.00	-.05	.04	.14	.00	.09
Alcohol quantity	-.02	.00	.12	.15	.18	.18
Binge drinking frequency	-.09	-.11	.09	.12	.01	.09
Alcohol-related Problems	.20	.25	.37*	.41*	.34*	.38*

*Note* = 180 for all correlations. \*  $p < .001$  (two-tailed). Values for depressive coping motives, conformity motives, and alcohol-related problems are based on log transformations. Repetitive negative thought was included only as a secondary measure.

Table 5

*Correlations Between Anxiety Sensitivity and Alcohol-Related Variables*

<u>Alcohol-related variable</u>	<u>Anxiety Sensitivity</u>			
	<u>Total</u>	<u>Physical concerns</u>	<u>Cognitive concerns</u>	<u>Social concerns</u>
Anxious coping motives	.54*	.47*	.45*	.47*
Depressive coping motives	.50*	.45*	.44*	.40*
Conformity motives	.40*	.37*	.33*	.33*
Enhancement motives	.01	.01	-.01	-.05
Social motives	.24	.18	.15	.27*
Alcohol frequency	.11	.08	.10	.11
Alcohol quantity	.18	.17	.11	.17
Binge drinking frequency	.09	.10	.05	.07
Alcohol-related problems	.41*	.41*	.33*	.39*

*Note.*  $N = 180$  for all correlations. \*  $p < .001$  (two-tailed). Values for physical concerns, cognitive concerns, depressive coping motives, conformity motives, and alcohol-related problems are based on log transformations.

the social concerns dimension was significantly positively correlated with social, but not enhancement drinking motives (see Table 5).

### **Hypothesis Two: Does Rumination Mediate the Effect of Anxiety Sensitivity on Negative Drinking Motives?**

Our second hypothesis examined whether rumination mediated the relationship between anxiety sensitivity and negative drinking motives (i.e., coping and conformity). Other SA-maintaining factors (anticipatory processing, post-event processing, self-focused attention and safety behaviours) were also examined as potential mediators of this relationship. A bootstrapping approach based on 10,000 samples was employed (Hayes, 2013).

**Do SA-maintaining factors mediate the effect of anxiety sensitivity on anxious coping motives?** Findings revealed that anxiety sensitivity indirectly influenced anxious coping motives through anticipatory processing. As can be seen in Figure 1 and Table 6, anxiety sensitivity positively predicted anticipatory processing, which in turn positively predicted alcohol-related problems. A bias-corrected bootstrap confidence interval for the specific indirect effect was entirely above zero (Table 6). However, there was evidence that anxiety sensitivity influenced anxious coping motives independent of its relationship with anticipatory processing (see Figure 1 and Table 6).

**Do SA-maintaining factors mediate the effect of anxiety sensitivity on depressive coping motives?** Findings revealed that anxiety sensitivity influenced depressive coping drinking motives, but this relationship was not mediated by any of the SA-maintaining factors (see Figure 2 and Table 6).

**Do SA-maintaining factors mediate the effect of anxiety sensitivity on conformity motives?** Findings revealed that anxiety sensitivity indirectly influenced conformity drinking

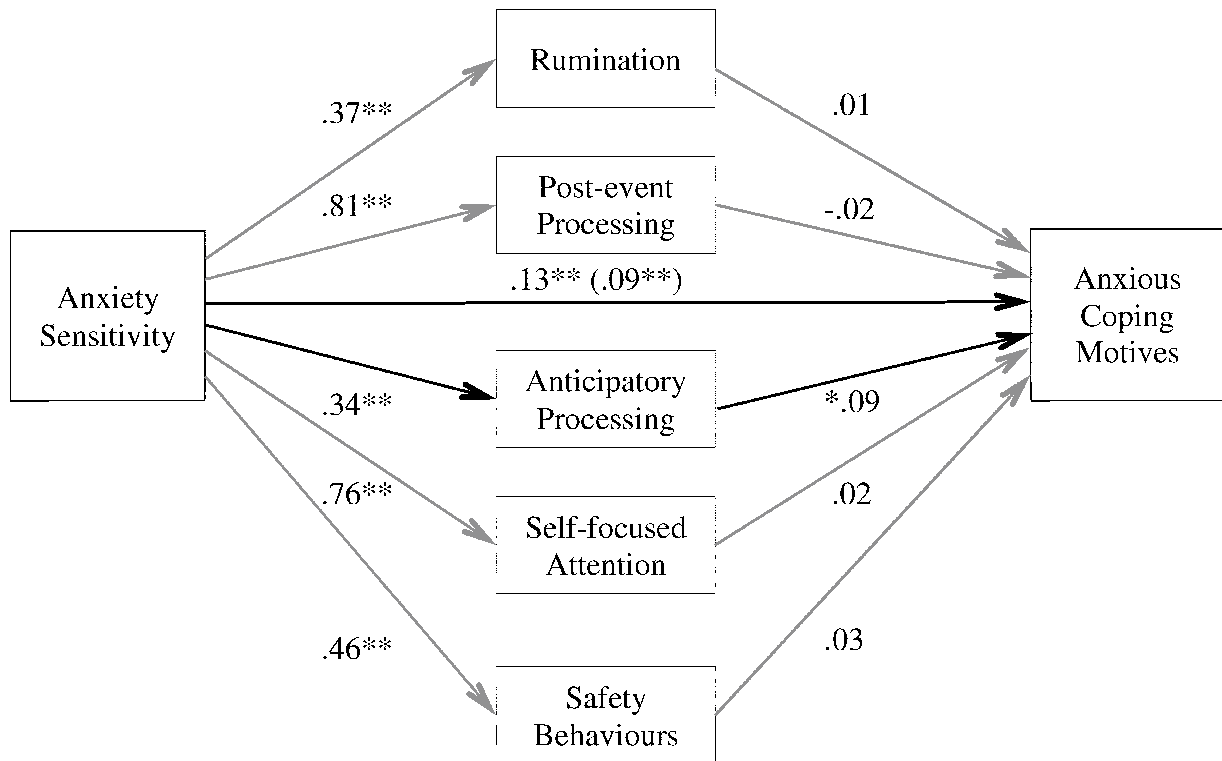


Figure 1. Model examining SA-maintaining factors as mediators of the relationship between anxiety sensitivity and anxious coping motives. Unstandardized beta weights are reported (total effect is in parentheses). \*  $p < .05$ , \*\*  $p < .001$ .



Table 6

*Direct and Indirect Effect of Anxiety Sensitivity on Negative Drinking Motives*

Model	Coefficient	SE	<i>p</i> -value	95 % CI		csES
				LL	UL	
<u>Model 1 (DV = anxious coping)</u>						
Total effect (c)	.13	.02	< .001	.1002	.1690	
Direct effect (c')	.09	.03	< .001	.0395	.1400	
Indirect effects ( <i>ab</i> )						
Total	.04	.02		.0120	.0823	.18
Rumination	.00	.01		-.0190	.0265	.01
Post-event processing	-.02	.01		-.0459	.0065	-.07
Anticipatory processing	.03	.01		.0049	.0597	.12
Self-focused attention	.01	.02		-.0195	.0498	.06
Safety behaviours	.01	.01		-.0148	.0474	.06
Total R <sup>2</sup> = .34						
<u>Model 2 (DV = depressive coping)</u>						
Total effect (c)	.27	.04	< .001	.2007	.3465	
Direct effect (c')	.19	.06	.001	.0773	.3014	
Indirect effects ( <i>ab</i> )						
Total	.08	.04		.0099	.1849	.15
Rumination	-.04	.03		-.1003	.0129	-.07
Post-event processing	.03	.03		-.0304	.0944	.06
Anticipatory processing	.03	.03		-.0228	.0967	.06
Self-focused attention	.02	.04		-.0633	.1052	.04
Safety behaviours	.03	.03		-.0246	.1039	.06
Total R <sup>2</sup> = .28						
<u>Model 3 (DV = conformity motives)</u>						
Total effect (c)	.11	.03	< .001	.0603	.1588	
Direct effect (c')	.05	.04	.16	-.0207	.1208	
Indirect effects ( <i>ab</i> )						
Total	.06	.02		.0151	.1107	.21
Rumination	-.04	.01		-.0674	-.0106	-.13
Post-event processing	.02	.02		-.0112	.0602	.08
Anticipatory processing	.03	.02		.0028	.0663	.11
Self-focused attention	.01	.02		-.0321	.0519	.03
Safety behaviours	.04	.02		.0049	.0786	.13
Total R <sup>2</sup> = .24						

*Note.* *N* = 180. Model 1 examines the indirect effect of anxiety sensitivity on anxious coping motives through SA-maintaining factors, Model 2 examines the indirect effect of anxiety sensitivity on depressive coping motives through SA-maintaining factors, and Model 3 examines the indirect effect of anxiety sensitivity on conformity motives through SA-maintaining factors. DV = dependent variable, CI = bias corrected confidence interval, csES = completely standardized effect size.

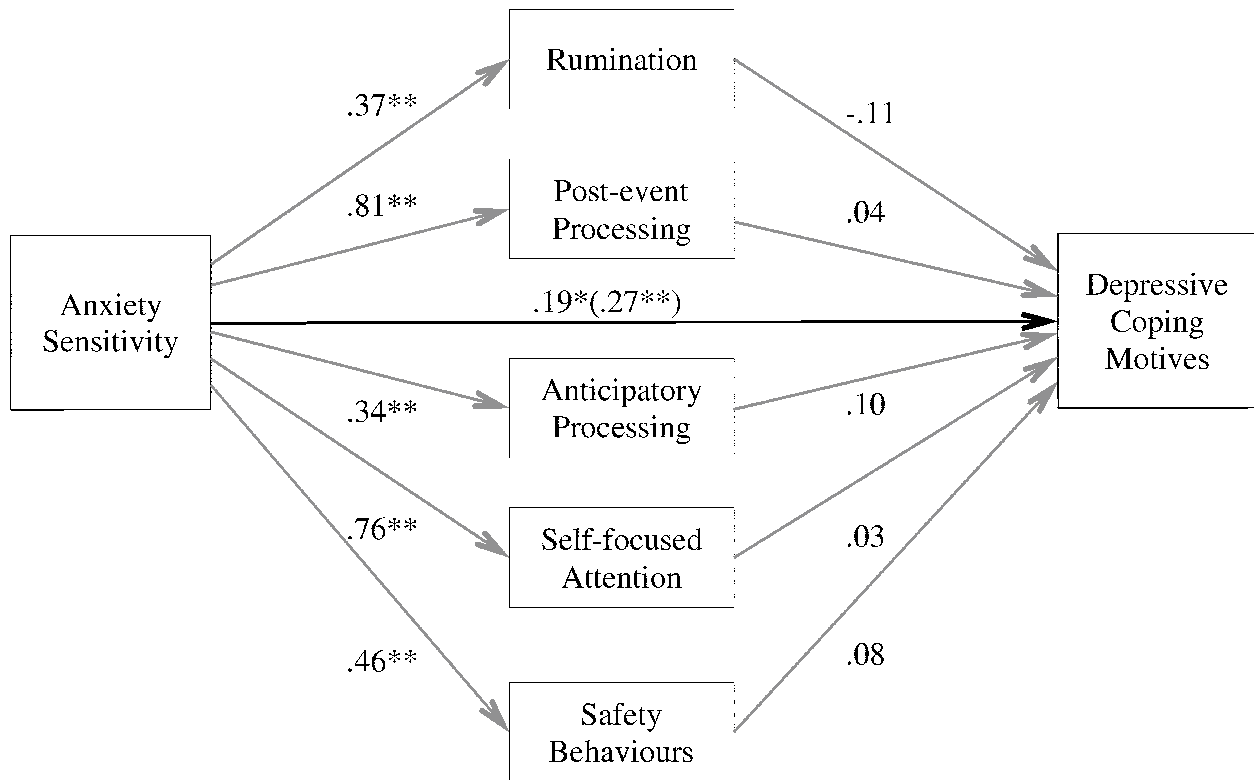


Figure 2. Model examining SA-maintaining factors as mediators of the relationship between anxiety sensitivity and depressive coping motives. Unstandardized beta weights are reported (total effect is in parentheses). \*  $p < .01$ , \*\*  $p < .001$ .

motives through rumination, anticipatory processing and safety behaviours. As can be seen in Figure 3, anxiety sensitivity positively predicted rumination, which in turn negatively predicted conformity drinking motives (bias-corrected bootstrap confidence intervals for the indirect effect through rumination did not contain zero; Table 6). There was also evidence that anticipatory processing and safety behaviours mediate the relationship between anxiety sensitivity and conformity motives (bias-corrected bootstrap confidence intervals for the indirect effects through anticipatory processing and safety behaviours did not contain zero; Table 6) although these relationships are considered less robust due to the insignificant paths between these mediators and conformity motives (“b” paths). In addition, there was evidence that anxiety sensitivity influenced conformity motives independent of its relationships with any of the aforementioned factors (see Figure 3 and Table 6).

### **Hypothesis Three: Do Negative Drinking Motives Mediate the Effect of SA on Alcohol-Related Problems?**

Our final hypothesis examined whether negative drinking motives mediate the relationship between SA and alcohol-related problems. It also examined whether negative drinking motives mediate the relationship between each SA-maintaining factor and alcohol-related problems. Once again, a bootstrapping approach based on 10,000 samples was employed (Hayes, 2013).

**Do coping and conformity motives mediate the effect of SA on alcohol-related problems?** Findings revealed that each type of SA (social interaction, social evaluation, and public speaking anxiety) indirectly influenced alcohol-related problems through depressive coping drinking motives (Figures 4 to 6). Bias corrected bootstrap confidence intervals for the indirect effects were entirely above zero (Table 7). However the paths between depressive coping motives and each outcome variable (“b” paths) were not significant, indicating that this

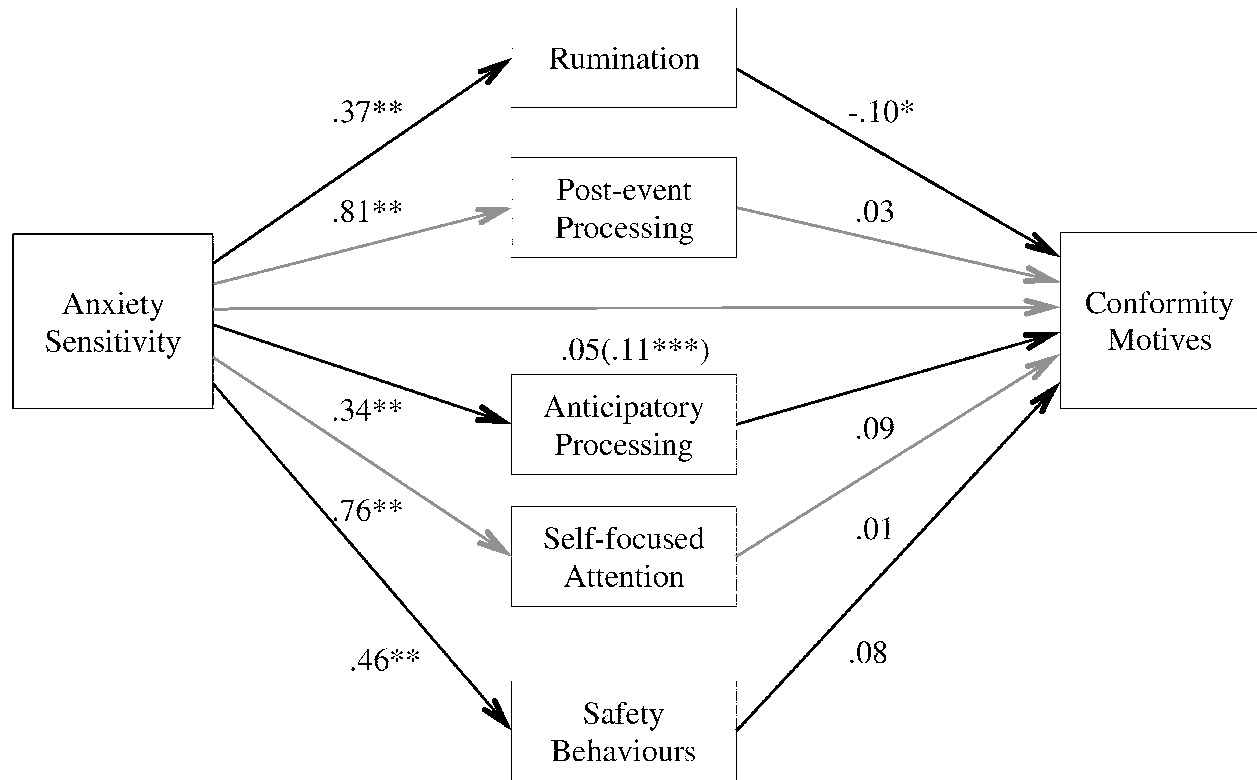


Figure 3. Model examining SA-maintaining factors as mediators of the relationship between anxiety sensitivity and conformity motives. Unstandardized beta weights are reported (total effect is in parentheses). \*  $p < .05$ , \*\*  $p < .001$ .

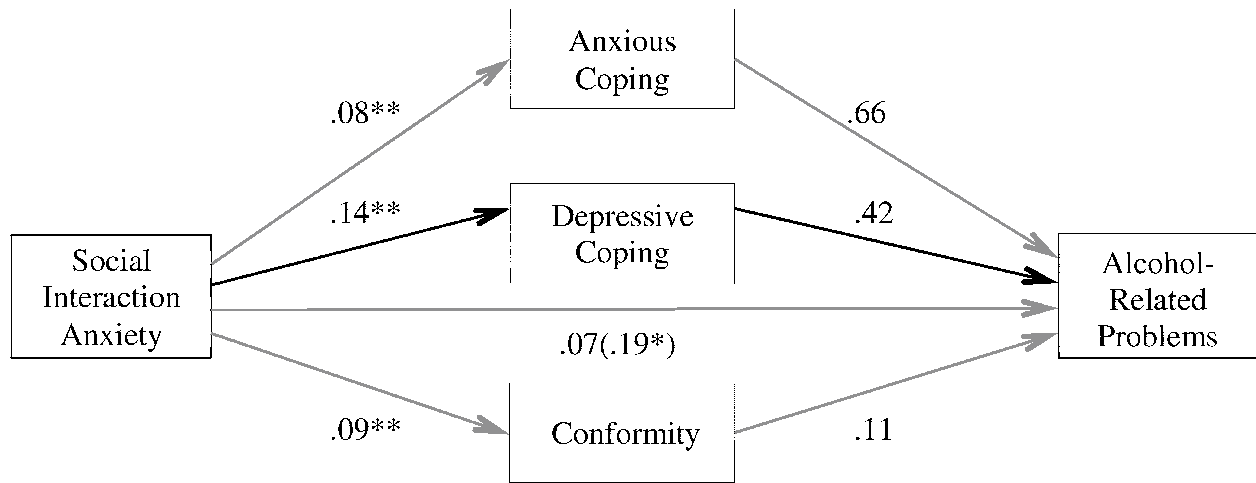


Figure 4. Model examining negative drinking motives as mediators of the relationship between social interaction anxiety and alcohol-related problems. Unstandardized beta weights are reported (total effect is in parentheses). \*  $p < .01$ , \*\*  $p < .001$ .

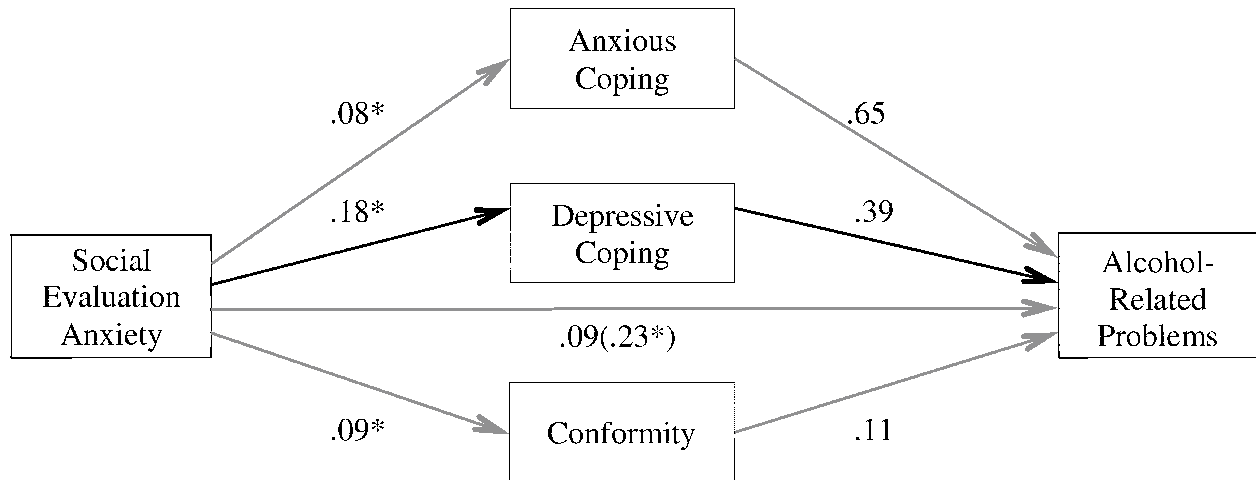


Figure 5. Model examining negative drinking motives as mediators of the relationship between social evaluation anxiety and alcohol-related problems. Unstandardized beta weights are reported (total effect is in parentheses). \*  $p < .001$ .

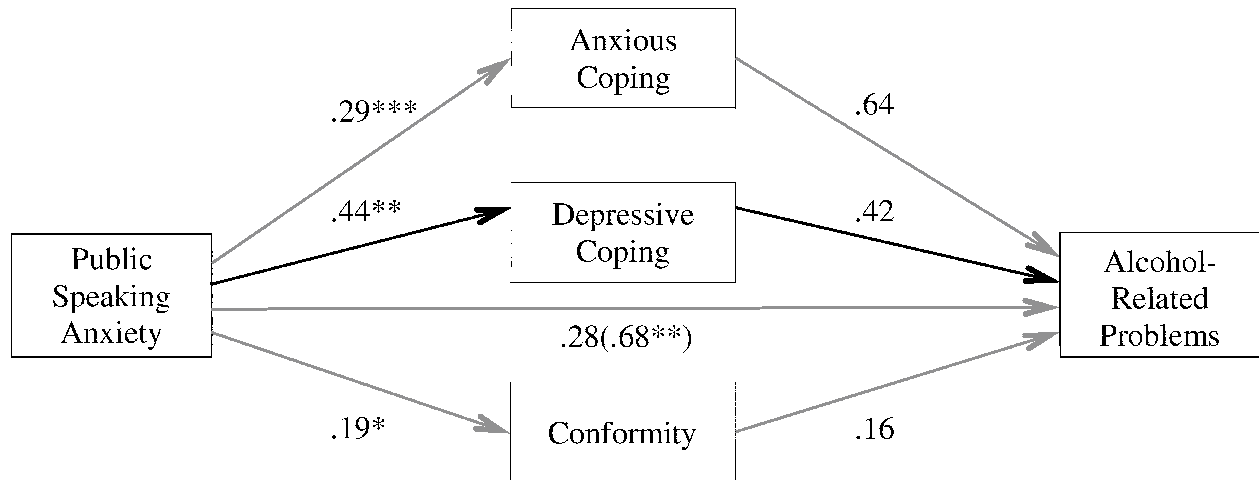


Figure 6. Model examining negative drinking motives as mediators of the relationship between public speaking anxiety and alcohol-related problems. Unstandardized beta weights are reported (total effect is in parentheses). \*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$ .

Table 7

*Direct and Indirect Effects of SA on Alcohol-related Problems*

Model	Coefficient	SE	<i>p</i> -value	95% CI		<i>c</i> <sub>s</sub> ES
				LL	UL	
<u>Model 1 (IV = social interaction anxiety)</u>						
Total effect ( <i>c</i> )	.19	.06	.002	.0729	.3087	
Direct effect ( <i>c'</i> )	.07	.06	.22	-.0417	.1785	
Indirect effects ( <i>ab</i> )						
Total	.12	.04		.0534	.2043	.17
Anxious coping motives	.05	.03		-.0032	.1254	.07
Depressive coping motives	.06	.04		.0064	.1559	.09
Conformity motives	.01	.03		-.0403	.0692	.01
Total R <sup>2</sup> = .33						
<u>Model 2 (IV = social evaluation anxiety)</u>						
Total effect ( <i>c</i> )	.23	.06	< .001	.1067	.3464	
Direct effect ( <i>c'</i> )	.09	.06	.11	-.0191	.2006	
Indirect effects ( <i>ab</i> )						
Total	.14	.04		.0681	.2235	.21
Anxious coping motives	.06	.03		-.0040	.1279	.08
Depressive coping motives	.07	.04		.0044	.1656	.11
Conformity motives	.01	.03		-.0412	.0675	.01
Total R <sup>2</sup> = .34						
<u>Model 3 (IV = public speaking anxiety)</u>						
Total effect ( <i>c</i> )	.68	.25	.008	.1798	1.1707	
Direct effect ( <i>c'</i> )	.28	.23	.24	-.1865	.7401	
Indirect effects ( <i>ab</i> )						
Total	.40	.16		.1338	.7464	.14
Anxious coping motives	.18	.12		-.0174	.4627	.06
Depressive coping motives	.18	.12		.0196	.4977	.06
Conformity motives	.03	.06		-.0629	.2047	.01
Total R <sup>2</sup> = .33						

*Note.* *N* = 180. Model 1 examines the indirect effect of social interaction anxiety on alcohol-related problems through coping and conformity motives, Model 2 examines the indirect effect of observation anxiety on alcohol-related problems through coping and conformity motives, and Model 3 examines the indirect effect of public speaking anxiety on alcohol-related problems through coping and conformity motives. IV = independent variable, CI = bias corrected confidence interval, *c*<sub>s</sub>ES = completely standardized effect size.



finding may not be sufficiently robust. Furthermore, there was no evidence that any type of SA influenced alcohol-related problems independent of its relationship with depressive coping drinking motives (see Figures 4 to 6 and Table 7).

**Do coping and conformity motives mediate the effect of SA-maintaining factors on alcohol-**

**related problems?** Findings revealed that rumination, anticipatory processing, self-focused attention and safety behaviours indirectly influenced alcohol-related problems through depressive coping drinking motives (Figures 7 to 11). Bias corrected bootstrap confidence intervals for the indirect effects were entirely above zero (Table 8). However the paths between depressive coping motives and alcohol-related problems (“b” paths) were not significant, indicating that this finding may not be sufficiently robust. Furthermore, rumination influenced alcohol-related problems independent of its relationship with depressive coping motives (Figure 7 and Table 8). Findings also revealed that post-event processing indirectly influenced alcohol-related problems through both depressive and anxious coping drinking motives (Figure 8). Bias corrected bootstrap confidence intervals for the indirect effects were entirely above zero (Table 8). However the paths between these mediators and alcohol-related problems (“b” paths) were not significant, indicating that this finding may not be sufficiently robust. There was no evidence that post-event processing influenced alcohol-related problems independent of its relationship with depressive and anxious coping motives.

**Subsequent Analyses**

**Which dimensions of anxiety sensitivity predict SA?** In an attempt to clarify previously inconsistent findings (Belcher & Peters, 2009; Drost et al., 2007; Grant et al., 2007; Rector et al., 2007), subsequent analyses were conducted to determine which dimension(s) of anxiety sensitivity best predicted social anxiety. A series of forced entry linear regressions were

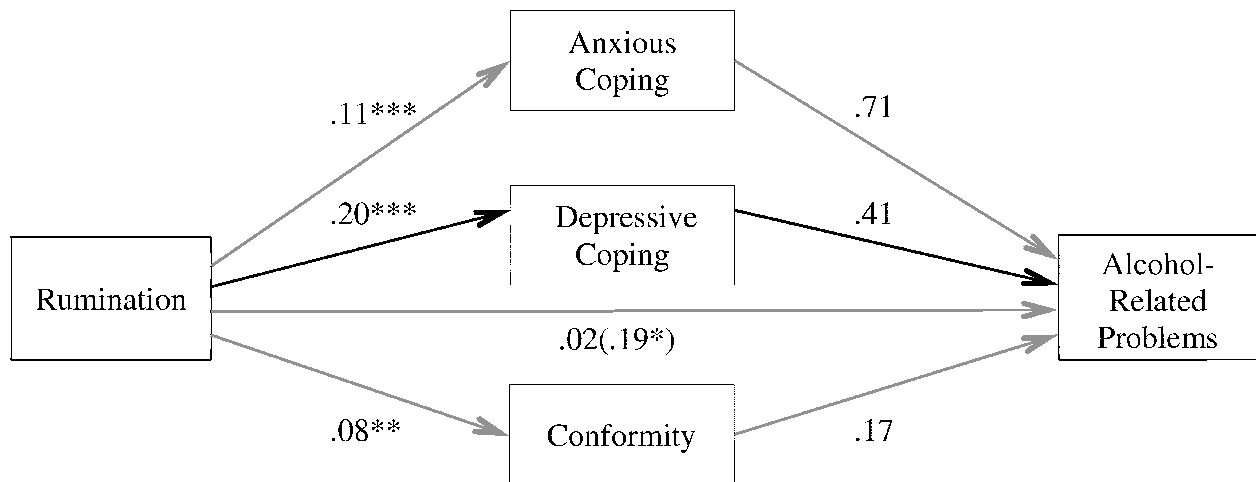


Figure 7. Model examining negative drinking motives as mediators of the relationship between rumination and alcohol-related problems. Unstandardized beta weights are reported (total effect is in parentheses). \*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$ .

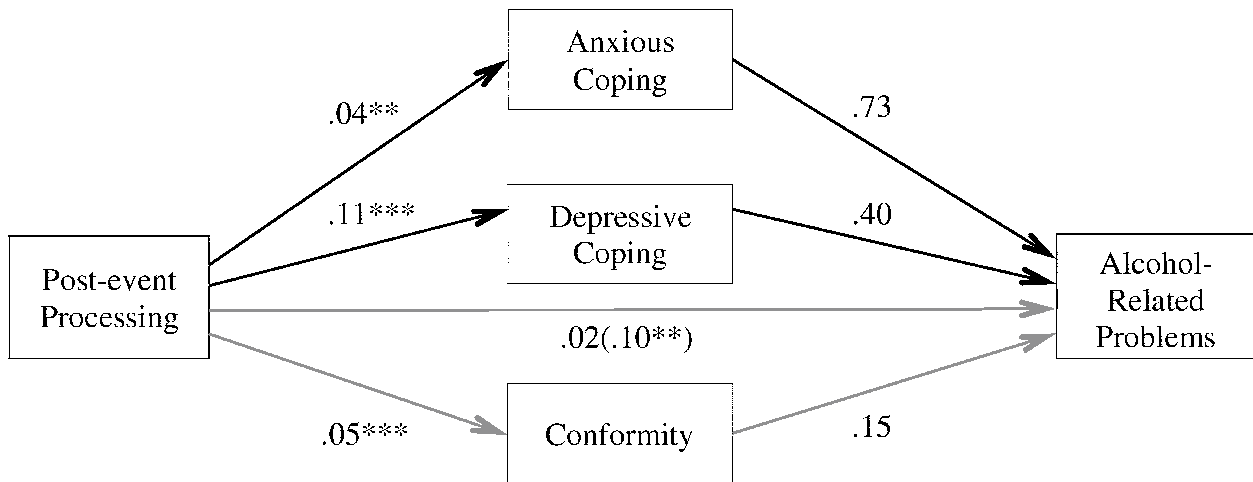


Figure 8. Model examining negative drinking motives as mediators of the relationship between post-event processing and alcohol-related problems. Unstandardized beta weights are reported (total effect is in parentheses). \*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$ .

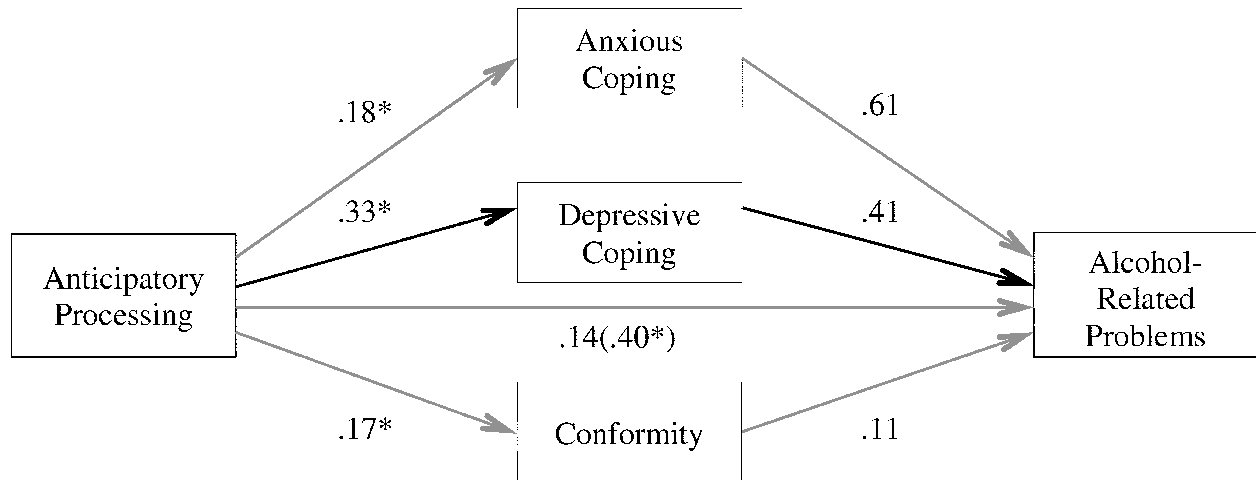


Figure 9. Model examining negative drinking motives as mediators of the relationship between anticipatory processing and alcohol-related problems. Unstandardized beta weights are reported (total effect is in parentheses). \*  $p < .001$ .

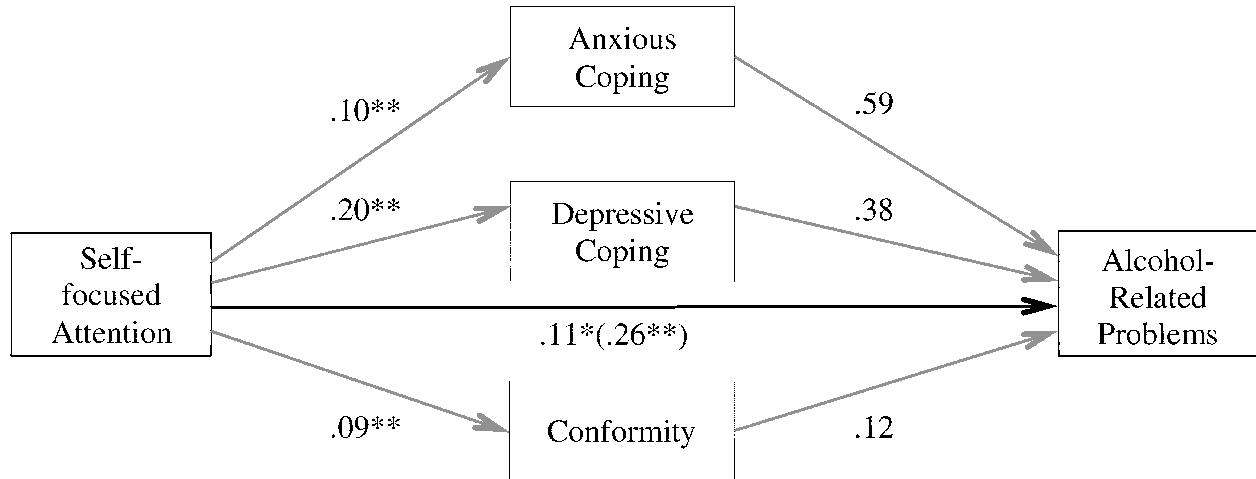


Figure 10. Model examining negative drinking motives as mediators of the relationship between self-focused attention and alcohol-related problems. Unstandardized beta weights are reported (total effect is in parentheses). \*  $p < .05$ , \*\*  $p < .001$ .

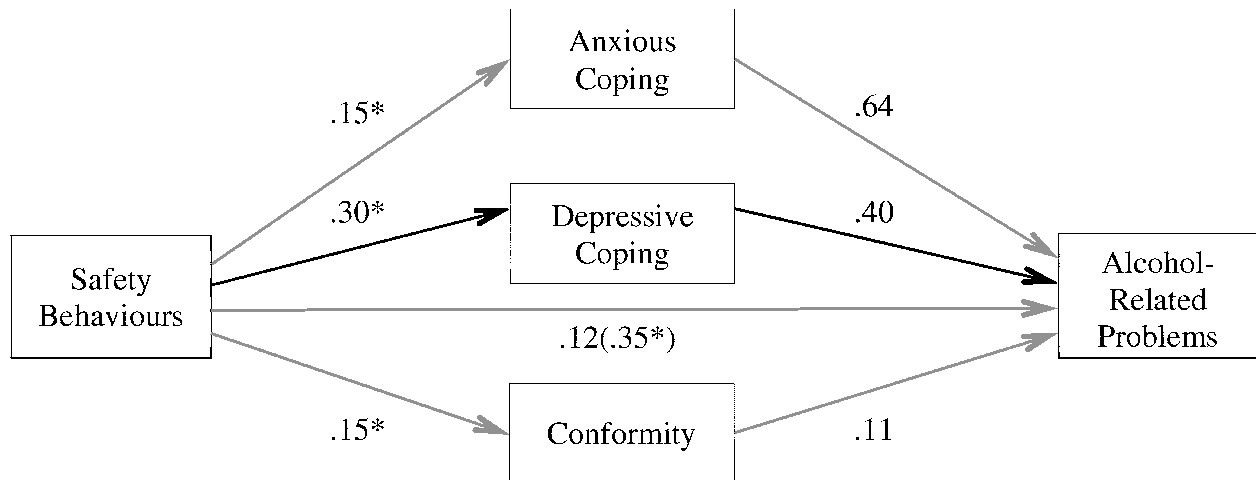


Figure 11. Model examining negative drinking motives as mediators of the relationship between safety behaviours and alcohol-related problems. Unstandardized beta weights are reported (total effect is in parentheses). \*  $p < .001$ .

Table 8

*Direct and Indirect Effects of SA-Maintaining Factors on Alcohol-Related Problems*

Model	Coefficient	SE	p-value	95% CI		csES
				LL	UL	
<u>Model 1 (IV = rumination)</u>						
Total effect (c)	.19	.08	.01	.0442	.3414	
Direct effect (c')	.02	.07	.82	-.1305	.1653	
Indirect effects ( <i>ab</i> )						
Total	.18	.05		.0803	.2926	.18
Anxious coping	.08	.05		-.003	.1814	.08
Depressive coping	.08	.05		.0076	.2178	.08
Conformity	.01	.02		-.0287	.0704	.01
Total R <sup>2</sup> = .32						
<u>Model 2 (IV = post-event processing)</u>						
Total effect (c)	.10	.04	.01	.0252	.1794	
Direct effect (c')	.02	.04	.59	-.0556	.0970	
Indirect effects ( <i>ab</i> )						
Total	.08	.03		.0351	.1414	.19
Anxious coping	.03	.02		.0042	.0708	.07
Depressive coping	.04	.03		.0028	.1080	.10
Conformity motives	.01	.02		-.0236	.0414	.02
Total R <sup>2</sup> = .32						
<u>Model 3 (IV = anticipatory processing)</u>						
Total effect (c)	.41	.10	< .001	.2111	.5985	
Direct effect (c')	.14	.10	.14	-.0488	.3345	
Indirect effects ( <i>ab</i> )						
Total	.26	.07		.1321	.4184	.22
Anxious coping	.11	.07		-.0155	.2480	.09
Depressive coping	.14	.07		.0154	.3038	.12
Conformity	.02	.05		-.0740	.1296	.02
Total R <sup>2</sup> = .33						
<u>Model 4 (IV = self-focused attention)</u>						
Total effect (c)	.26	.05	< .001	.1542	.3629	
Direct effect (c')	.11	.05	.03	.0124	.2133	
Indirect effects ( <i>ab</i> )						
Total	.15	.04		.0831	.2290	.22
Anxious coping	.06	.04		-.0115	.1385	.09
Depressive coping	.08	.04		.0035	.1716	.12
Conformity	.01	.03		-.0418	.0648	.02
Total R <sup>2</sup> = .35						

Model 5 (IV = safety behaviours)

Total effect (c)	.35	.10	< .001	.1574	.5362	
Direct effect (c')	.12	.09	.21	-.0652	.2965	
Indirect effects (ab)						
Total	.23	.06		.1253	.3636	.23
Anxious coping	.09	.06		-.0151	.2170	.09
Depressive coping	.12	.07		.0103	.2692	.12
Conformity	.02	.04		-.0657	.1137	.02
Total R <sup>2</sup> = .33						

*Note.*  $N = 180$ . Model 1 examines the indirect effect of rumination on alcohol-related problems through coping and conformity motives, Model 2 examines the indirect effect of post-event processing on alcohol-related problems through coping and conformity motives, Model 3 examines the indirect effect of anticipatory processing on alcohol-related problems through coping and conformity motives, Model 4 examines the indirect effect of self-focused attention on alcohol-related problems through coping and conformity motives, and Model 5 examines the indirect effect of safety behaviours on alcohol-related problems through coping and conformity motives. IV = independent variable, CI = bias corrected confidence interval  $c_{SES}$  = completely standardized effect size.



conducted, with all three dimensions of anxiety sensitivity included as predictors, and social interaction/evaluation/public speaking anxiety set as the dependent variable. Findings revealed that both social and cognitive concerns positively predicted social interaction anxiety,  $b = 1.18$ ,  $t(176) = 5.18$ ,  $p < .001$  and  $b = .68$ ,  $t(176) = 2.57$ ,  $p = .01$ , respectively ( $R^2 = 36.3\%$ ). Findings also revealed that both social and cognitive concerns positively predicted social evaluation anxiety,  $b = 1.27$ ,  $t(176) = 5.80$ ,  $p < .001$  and  $b = .69$ ,  $t(176) = 2.74$ ,  $p = .01$ , respectively ( $R^2 = 47.6\%$ ). Alternatively, only social concerns positively predicted public speaking anxiety,  $b = .32$ ,  $t(176) = 5.33$ ,  $p < .001$  ( $R^2 = 36.3\%$ ).

### Discussion

The current study was intended to clarify the relationships between social anxiety, anxiety sensitivity and problematic drinking among undergraduates. It did so by seeking to 1) confirm the relationships between dimensions of anxiety sensitivity, SA-related variables, and alcohol-related variables, 2) verify whether rumination, and determine whether other SA-maintaining factors, serve to mediate the relationship between anxiety sensitivity and negative drinking motives, and 3) determine whether negative drinking motives mediate the relationship between SA/SA-maintaining factors and alcohol-related problems.

### Relationships Among Study Variables

Overall, results partially supported our first hypothesis. Expected positive correlations were observed between SA, SA-maintaining factors and anxiety sensitivity; participants high in SA were likely to report greater anxiety sensitivity and a greater tendency to engage in thoughts/behaviours that maintain SA. Positive correlations also emerged between social interaction and evaluation anxiety and negative drinking motives; participants high in either type of SA were likely to report engaging in negative reinforcement drinking. Similarly, positive correlations were observed between most SA-maintaining factors (excluding rumination) and negative drinking motives, indicating that those who

engaged in more SA-maintaining thoughts/behaviours were likely to report engaging in negative reinforcement drinking as well. (It should be noted that although failing to reach significance, the relationship between rumination and conformity motives was also in the expected direction.)

Alternatively, findings revealed positive correlations between public speaking anxiety and anxious coping, but not depressive coping or conformity drinking motives. These findings suggest that those high in public speaking anxiety were likely to report drinking to cope with feelings of anxiety, but not to cope with feelings of depression or as a way of “fitting in”.

Interestingly, although prior research has often found SA to be associated with negative reinforcement drinking patterns (Blumenthal et al., 2010; Windle & Windle, 2012), the current study found significant positive correlations between social drinking motives and anticipatory processing, self-focused attention and general repetitive negative thought. These findings indicate that those who engaged in more of these anxiety-maintaining cognitive processes were likely to report social drinking as well. Additionally, findings revealed that only one type of SA (i.e., social evaluation) and some SA-maintaining factors (i.e., anticipatory processing, self-focused attention, safety behaviours) were significantly positively associated with alcohol-related problems. While the remaining relationships did not reach significance, they were in the expected positive direction. Finally, contrary to hypothesis, no significant relationships emerged between quantity/frequency of alcohol use and SA or SA-maintaining factors. These findings are inconsistent with our initial hypothesis and may have reflected the fact that the current study used a non-clinical sample. More specifically, participants were required to have consumed alcohol only once during the last year, and were not required to be high in SA.

Finally, as expected, there were significant positive correlations among each anxiety sensitivity dimension, negative drinking motives and alcohol-related problems. In other words, participants high in anxiety sensitivity were likely to report engaging in negative reinforcement drinking and

experiencing more alcohol-related problems. Alternatively, anxiety sensitivity was found to be unrelated to quantity or frequency of alcohol use. Overall, these results suggest that despite not consuming more alcohol, those with higher anxiety sensitivity engage in more negative reinforcing drinking and experience more alcohol-related problems.

**SA, SA-maintaining factors, and anxiety sensitivity.** Overall, findings are consistent with theoretical models of SA (Clark & Wells, 1995; Rapee & Heimberg, 1998), which propose a relationship between level of SA and each of the SA-maintaining factors (i.e., rumination, post-event processing, anticipatory processing, self-focused attention safety behaviours). Findings are also consistent with prior research that has reported a positive association between SA and the lower order dimensions of anxiety sensitivity among undergraduates (Grant et al., 2007). There has been much debate regarding the dimension of anxiety sensitivity that is most strongly associated with SA (Drost et al., 2012; Szacun-Shimizu & Leybman, 2007), and findings from the current study serve to clarify these relationships. More specifically, while initial findings showed all dimensions of anxiety sensitivity to be positively correlated with SA, supplementary analyses revealed that not all dimensions predicted SA. Instead, findings suggest that social and cognitive concerns positively predict social interaction and evaluation anxiety, while public speaking anxiety is predicted only by elevated social concerns. These findings are consistent with prior research that has found positive correlations between SA and all three dimensions of anxiety sensitivity (Grant et al., 2007). They are also consistent with findings by Drost et al. (2012), who found that only social and cognitive concerns predicted SA among undergraduates. In regards to public speaking anxiety, findings demonstrate the importance of differentiating this type of SA from other types, which was most recently reflected in changes to the DSM-5 (APA, 2013).

**SA, SA-maintaining factors and alcohol consumption.** Contrary to the hypothesis, there were no significant correlations between SA and quantity and frequency of alcohol consumption. Similarly, there were no significant relationships between SA-maintaining factors and alcohol consumption. These findings are inconsistent with prior research that has suggested the presence of positive (Battista & Kocovski, 2010; Kidorf & Lang, 1999; Lewis & O'Neill, 2000) or negative (Eggleston et al., 2004; Ham & Hope, 2005; Morris et al., 2004) relationships. Notably, findings are also inconsistent with prior research that has used similar measures of SA (Eggleston et al., 2004). However, Bruch et al. (1991), who obtained similar results as the current study, examined the relationship between alcohol consumption and a related construct, shyness. This may suggest that participants from the current study more closely resembled individuals that would be considered shy as opposed to socially anxious. Indeed, participants scored relatively low on all three measures of SA (see Table 1).

Interestingly, while researchers have proposed that lower levels of alcohol consumption might be related to socially anxious individuals' tendency to avoid social situations altogether (Eggleston et al., 2004; Morris et al., 2004), the current study did not find support for this. More specifically, findings revealed no relationship between social avoidance and level of alcohol use, thereby suggesting that lower consumption is not the result of avoiding situations in which alcohol is readily available. However, future research is warranted to investigate this relationship further.

**SA, SA-maintaining factors and drinking motives.** The current study found both social interaction and evaluation anxiety to be positively associated with coping and conformity drinking motives. These findings are largely consistent with prior research by Stewart et al. (2006), who despite using a different measure of SA (i.e., fear of negative evaluation), found a positive association with both forms of negative reinforcement drinking (Stewart et al., 2006). On the contrary, findings are inconsistent with studies that have found SA to be associated only with coping motives (Blumenthal et

al., 2010), enhancement motives (Buckner et al., 2006), or with all four patterns of drinking (Ham et al., 2009). While one might hypothesize that different findings emerged as a result of different measures being used to assess SA, findings are least consistent with research that has used the SIAS as well (Buckner et al., 2006). Alternatively, findings showed that public speaking anxiety was related only to anxious-coping drinking motives. These findings may reflect the specific nature of this type of anxiety, and the fact that more specific forms of SA have been proposed to be less severe than more generalized ones (Brown et al., 1995).

Results from the current study also suggest that each of the SA-maintaining factors is associated with negative reinforcement drinking as well (excluding the relationship between rumination and conformity motives). While this study (to our knowledge) is the first to examine these relationships, these findings make sense given the relationships observed between SA and negative reinforcement drinking. Overall, this study suggests that, despite being unrelated to quantity and frequency of alcohol use, both SA and the thoughts/behaviours that maintain it are most strongly associated with coping and conformity-motivated drinking. One distinction, however, emerged: public speaking anxiety appears to be associated only with drinking to cope with feelings of anxiety, demonstrating the value of distinguishing between types of SA in future research. Interestingly, similar to research by Stewart et al. (2006), the current study suggests that some SA-related variables (i.e., anticipatory processing, self-focused attention, repetitive negative thinking) are also associated with social drinking.

**SA, SA-maintaining factors and alcohol-related problems.** Overall, findings from the current study suggest that only specific types of SA are associated with alcohol-related problems. Similar to prior research, findings showed alcohol-related problems to be unrelated to social interaction anxiety (Eggleston et al., 2004), but positively associated with anxiety in response to social evaluation/scrutiny (Lewis et al., 2008). Interestingly, while public speaking anxiety is conceptually similar to social

evaluation anxiety (i.e., the former being a specific form of the latter), the current study did not find it to be related to alcohol-related problems. One possible explanation may again be the specific and less severe nature of public speaking anxiety.

Findings also revealed that anticipatory processing, self-focused attention and safety behaviours were associated with more alcohol-related problems, while rumination and post-event processing were not. Interestingly, despite failing to find a significant relationship with rumination/post-event processing, results showed that alcohol-related problems were positively associated with a more general measure of repetitive negative thought. These findings may suggest that while a general tendency to engage in repetitive negative thinking is associated with alcohol-related problems, the tendency to dwell on a situation after a social stressor (i.e., rumination and post-event processing) is not. Therefore, despite recent efforts to combine various forms of repetitive negative thinking into single measures (Mahoney et al., 2012; McEvoy et al., 2010), it may be of value to continue differentiating between them in research settings.

**Anxiety sensitivity and alcohol use.** Finally, findings from the study's first hypothesis showed that although anxiety sensitivity was unrelated to quantity and frequency of alcohol use, it was positively associated with negative reinforcement drinking and alcohol-related problems. These findings are consistent with prior research, which has found a positive association between anxiety sensitivity and drinking to cope with feelings of anxiety and negative affect (Kushner et al., 2001). Findings are also similar to those by Howell et al. (2010), which demonstrated positive associations between anxiety sensitivity and both conformity-motivated drinking and alcohol use problems. Although correlational in nature, findings from this study are consistent with the notion that individuals with elevated anxiety sensitivity may find alcohol particularly effective for reducing anxiety, and therefore engage in negative reinforcement drinking patterns (Pihl & Peterson, 1995).

### **Do SA-Maintaining Factors Mediate the Effect of Anxiety Sensitivity on Negative Reinforcement Drinking?**

Our second hypothesis served to verify whether rumination mediates the relationship between anxiety sensitivity and negative reinforcement drinking. We also aimed to determine whether other SA-maintaining factors mediate this relationship. Results showed partial support for rumination mediating the relationship between anxiety sensitivity and negative drinking motives. More specifically, rumination, anticipatory processing and safety behaviours were found to mediate the relationship between anxiety sensitivity and conformity motives outside of the effects of other SA-maintaining factors. Alternatively, rumination did not mediate the relationship between anxiety sensitivity and depressive coping motives once the effects of the other SA-maintaining factors were controlled for. Rumination also failed to mediate the relationship between anxiety sensitivity and anxious coping drinking motives. These findings suggest that those high in anxiety sensitivity are likely to ruminate more, which in turn leads them to drink as a way to avoid social rejection/criticism less often. Alternatively, individuals high in anxiety sensitivity are likely to engage in more anticipatory processing and use more safety behaviours, which in turn leads them to drink as a way to avoid social rejection/criticism.

Interestingly, despite finding significant indirect effects of anxiety sensitivity on conformity motives through rumination, anticipatory processing and safety behaviours, the relationships between anticipatory processing/safety behaviours and conformity motives were not significant. Although Hayes (2013) suggests that significant *a* and *b* paths are not necessary for an indirect effect to be significant, two possible explanations exist for these findings. First, findings may reflect the fact that in the absence of elevated anxiety sensitivity, anticipatory processing and safety behaviours do not predict conformity-motivated drinking. Future research might aim to explore this possible using moderation

analyses. Alternatively, findings may reflect the fact that inclusion of multiple mediators resulted in greater error and lower power to detect significant effects. In fact, subsequent analyses revealed that when only significant mediators were included in the model (i.e., rumination, anticipatory processing and safety behaviours), the paths from anticipatory processing/safety behaviours to conformity motives also reached significance. Replication of the present study, and use of a larger sample, would provide greater confidence in the robustness of these findings.

Results from the current study also found that anticipatory processing mediated the relationship between anxiety sensitivity and anxious coping motives. Alternatively, while examining the indirect relationship between anxiety sensitivity and depressive coping motives, none of the SA-maintaining factors has a strong enough effect to mediate the relationship by itself. Overall, these findings suggest that those high in anxiety sensitivity drink to cope with feelings of anxiety, and this relationship is partially explained by their tendency to engage in more anticipatory processing prior to a social event. Alternatively, while those high in anxiety sensitivity drink to cope with feelings of depression, SA-maintaining factors demonstrate only small mediating effects. Notably, anxiety sensitivity continued to influence anxious and depressive coping motives outside of the effects of the proposed mediators, and it is therefore likely that other unexplored factors also play an important role in these relationships. One possibility, which has received increasing attention in the area of SA, is alcohol expectancies (see Morris et al., 2005 for a review). Once again, replication of the current study, with a larger sample size, would increase confidence in the robustness of our findings.

Overall, findings from the study's second hypothesis are partially consistent with prior research. For instance, results are similar to findings by Kushner et al. (2001) who found that SA mediated the effect of anxiety sensitivity on drinking to cope with feelings of anxiety and negative affect. Alternatively, while the current study found support for rumination mediating the relationship between



anxiety sensitivity and negative reinforcement drinking (Harwell et al., 2011), the direction of this relationship was not in the expected direction. More specifically, while Harwell et al. (2011) proposed that greater rumination led to more negative reinforcement drinking, the current study found evidence to the contrary. Such a discrepancy may be due in part to the fact that rumination is highly correlated with post-event processing and safety behaviours, and Harwell et al. (2011) failed to account for these factors in their model. Alternatively, they may be related to the fact that, despite including a general measure of anxious rumination (i.e., the RRQ), the current study focused on the mediating role of SA-maintaining factors in particular, whereas Harwell et al. (2011) did not. Nevertheless, findings from this study demonstrate the importance of considering the role of various cognitive and behavioural processes when examining the relationship between anxiety sensitivity and negative reinforcement drinking. Additionally, the fact that rumination and safety behaviours only mediated the relationship between anxiety sensitivity and conformity motives suggests that it is also important to distinguish between specific forms of negative reinforcement drinking.

A number of possible explanations exist as to why only anticipatory processing and (in the case of conformity motives), rumination and safety behaviours mediated the relationship between anxiety sensitivity and negative drinking motives. In regards to coping motives, one major difference between anticipatory processing and the other SA-maintaining factors is that the former takes place prior to an anxiety-provoking social situation. In essence, these findings may suggest that elevated anxiety sensitivity leads an individual to engage in excessive anticipatory processing prior to a social situation. The individual then uses alcohol as a means of reducing their level of anxiety. This notion is consistent with early research by Turner et al. (1986), which found 50% of those diagnosed with SAD (who would seemingly be higher in anxiety sensitivity) reported consuming alcohol prior to social situations to reduce their anticipatory anxiety. Alternatively, given that no specific indirect effects were found

between anxiety sensitivity and depressive coping motives, all SA-maintaining factors appear to play only small and insignificant roles in explaining the relationship between SA and drinking to cope with feelings of depression.

In regards to conformity motives, findings suggest that elevated anxiety sensitivity leads an individual to engage in more rumination and anticipatory processing, and perform more safety behaviours to reduce their SA. In turn, higher rumination leads the individual to engage in less conformity-motivated drinking, whereas higher anticipatory processing and safety behaviours lead the individual to engage in more. Although (to our knowledge) this is the first study to examine these indirect relationships, findings may help clarify the relationship between anxiety sensitivity, a dispositional tendency, and the decision to drink as a way to avoid criticism and/or rejection. Furthermore, findings suggest that reducing socially anxious individuals' anticipatory processing and use of safety behaviours may in turn reduce the likelihood that they will drink as a means of "fitting in".

### **Do Negative Drinking Motives Mediate the Effect of SA/SA-Maintaining Factors on Alcohol-Related Problems?**

Our final hypothesis examined whether negative drinking motives mediate the relationship between SA/SA-maintaining factors and alcohol-related problems. Results partially supported this hypothesis, with depressive and anxious coping motives emerging as significant mediators. More specifically, results showed that depressive coping motives mediated the relationship between each type of SA and alcohol-related problems outside of the effects of coping and conformity motives. These findings suggest that individuals high in social interaction, evaluation or public speaking anxiety experience more alcohol-related problems, and this relationship is fully explained by their tendency to drink to cope with feelings of depression. Findings also revealed that depressive coping motives

mediated the relationship between rumination/anticipatory processing/self-focused attention/safety behaviours and alcohol-related problems. Alternatively, both depressive and anxious coping motives mediated the relationship between post-event processing and alcohol problems. Overall, these findings suggest that those who perform more safety behaviours or engage in more rumination, anticipatory processing or self-focused attention experience more alcohol-related problems. For the most part, these relationships appear to be fully explained by their tendency to drink to cope with feelings of depression. Alternatively, those who engage in more post-event processing experience more alcohol-related problems, and this relationship is explained by their tendency to drink to cope with feelings of depression *and* anxiety.

Once again, despite finding significant indirect effects of SA/SA-maintaining actors on alcohol-related problems, the relationships between depressive coping (and in the case of post-event processing anxious coping) drinking motives and alcohol-related problems were not significant. Subsequent analyses again revealed that when only significant mediators were included in the model (i.e., depressive coping motives and in the case of post-event processing both depressive and anxious coping motives), the *b* paths again reached, or approached significant (*ps* ranging from  $< .001$  to  $.05$ ).

Interestingly, contrary to what one might expect, findings from the current study suggest that depressive coping motives are (for the most part) the strongest mediator of the relationship between SA/SA-maintaining factors and alcohol-related problems. Lastly, given that self-focused attention continued to influence alcohol-related problems outside of the effects of the proposed mediators, it appears that other unexplored factors also play a role in this relationship.

Overall, results from the study's final hypothesis provide evidence that SA and thoughts/behaviours that maintain SA are not only correlated with negative reinforcement drinking (as demonstrated via hypothesis one), but also predictive of this type of drinking. These findings are

consistent with prior research that has reported similar findings (Blumenthal et al., 2010; Stewart et al., 2006). In regards to the mediating role of negative drinking motives, findings are consistent with prior research that has found that coping drinking motives mediate the relationship between SA and alcohol-related problems (Lewis et al., 2008). However, contrary to Lewis et al. (2008), the current study did not find that conformity motives mediated this relationship. Findings also similar to those by Morris et al. (2004), who found that among undergraduates, drinking to cope mediates the relationship between fear of negative evaluation (a core feature of SA) and alcohol-related problems. Notably, however, while the current study distinguished between anxious and depressive coping motives, the former studies did not.

In fact, findings from the current study emphasize the importance of distinguishing between types of coping when considering drinking motives. More specifically, contrary to what one might have expected, findings showed that depressive coping motives were a stronger mediator of the relationship between SA and alcohol-related problems than were anxious coping motives. Similarly, findings suggested that depressive coping motives were the strongest mediator of the relationship between most SA-maintaining factors (excluding post-event processing) and alcohol-related problems. One possible explanation for these findings is that while the shorter anxious coping subscale of the M-DMQ-R assessed drinking to cope with anxiety in particular, the longer depressive coping subscale may have assessed drinking to cope with negative affect in general. Findings may therefore reflect the fact that higher SA and greater use of SA-maintaining factors lead an individual to drink as a way to cope with negative affect in general, which subsequently leads to more alcohol-related problems. Nevertheless, findings suggest that by addressing the reasons *why* a socially anxious individual drinks, professionals may be better able to reduce the likelihood that they will experience alcohol-related problems.

Interestingly, findings from the current study also found that both anxious and depressive

coping motives mediated the relationship between post-event processing and alcohol-related problems. Although prior research has examined the relationship between post-event processing and alcohol use among undergraduates (Battista & Kocovski, 2010), methodological differences preclude us from making any direct comparisons between studies. More specifically, while Battista & Kocovski (2010) found that amount of alcohol consumed at a social event was positively associated with level of post-event processing after the event, the current study examined post-event processing as a precursor to negative reinforcement drinking. Given the cross-sectional nature of the current study, future research is warranted to determine whether post-event processing predicts negative reinforcement drinking, vice versa, or both.

### **Limitations and Future Research**

Despite further clarifying the relationship between SA and problematic drinking among undergraduates, the current study contained a number of limitations, which point to suggestions for future research. First, the cross-sectional nature of the study precludes us from making any definitive conclusions regarding causal ordering among our variables. As a result, all findings are limited to inferring statistical rather than true mediation. Future research would benefit from examining these relationships using prospective and longitudinal designs, in which causal order can be determined.

Another limitation of the current study was the use of a non-clinical undergraduate sample. Although this sample was ideal to examine the relationship between SA and problematic drinking among undergraduates, findings may not extend to community and/or clinical samples, and external validity may therefore be threatened. Furthermore, in the current study, undergraduates were eligible to participate as long as they had consumed alcohol at least once in the past year, thereby making it possible for even those with low levels of SA and problematic drinking to participate. As a result, it would be of value for future research to attempt to replicate these findings in undergraduates who are

high in SA and problematic drinking.

The current study is also limited by the fact that individuals were asked to complete retrospective, self-report measures. Although the confidential nature of the study makes it unlikely that participants intentionally tried to portray themselves favourably, findings may have been subject to response bias. In addition, participants may not have accurately remembered their use of cognitive/behavioural processes such as the ones assessed in this study (i.e., SA-maintaining factors), and findings therefore may not be entirely accurate. As a result, future research would benefit greatly from including observer ratings as well.

Finally, due to practical reasons, it is possible that other important variables were not included while testing our models. For instance, prior research has demonstrated the importance of considering alcohol expectancies and situational factors while examining the relationship between SA and problematic drinking (see Morris et al., 2005 for review). Future research should strive to build larger and more comprehensive models in which factors such as these are considered in addition those variables examined in our study.

Overall, the current study served to clarify the relationships between SA, anxiety sensitivity and problematic drinking among undergraduates. Findings suggest that while SA, SA-maintaining factors and anxiety sensitivity are all unrelated to quantity/frequency of alcohol consumption, these variables are generally related to negative reinforcement drinking and alcohol-related problems. Mediation analyses suggest that anxiety sensitivity indirectly influences anxious coping-motivated drinking through anticipatory processing, and influences conformity-motivated drinking indirectly through rumination, anticipatory processing and safety behaviours. Alternatively, no unique indirect effects were found between anxiety sensitivity and drinking to cope with feelings of depression. Mediation analyses also suggest that social interaction/evaluation/public speaking anxiety and

rumination/anticipatory processing/self-focused attention/safety behaviours indirectly influence alcohol-related problems through depressive coping, but not anxious coping or conformity-motivated drinking. Alternatively, post-event processing indirectly influenced alcohol-related problems through both depressive and anxious coping-motivated drinking.

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**Appendix A**  
**Social Interaction Anxiety Scale (SIAS)**

For each of the questions, please check a number to indicate the degree to which you feel the statement is characteristic or true of you. The rating scale is as follows:

0 = Not at all, 1 = Slightly, 2 = Moderately, 3 = Very, 4 = Extremely

Characteristic	Not at all	Slightly	Moderately	Very	Extremely
1. I get nervous if I have to speak with someone in authority (teacher, boss).	0	1	2	3	4
2. I have difficulty making eye contact with others.	0	1	2	3	4
3. I become tense if I have to talk about myself or my feelings.	0	1	2	3	4
4. I find difficulty mixing comfortably with the people I work with.	0	1	2	3	4
5. I find it easy to make friends my own age.	0	1	2	3	4
6. I tense up if I meet an acquaintance on the street.	0	1	2	3	4
7. When mixing socially, I am uncomfortable.	0	1	2	3	4
8. I feel tense if I am alone with just one person.	0	1	2	3	4
9. I am at ease meeting people at parties, etc.	0	1	2	3	4
10. I have difficulty talking with other people.	0	1	2	3	4
11. I find it easy to think of things to talk about.	0	1	2	3	4
12. I worry about expressing myself in case I appear awkward.	0	1	2	3	4
13. I find it difficult to disagree with another's point of view.	0	1	2	3	4
14. I have difficulty talking to attractive people of the opposite sex.	0	1	2	3	4
15. I find myself worrying that I won't know what to say in social situations.	0	1	2	3	4
16. I am nervous mixing with people I don't know well.	0	1	2	3	4
17. I feel I'll say something embarrassing when talking.	0	1	2	3	4
18. When mixing in a group, I find myself worrying I will be ignored.	0	1	2	3	4
19. I am tense mixing in a group.	0	1	2	3	4
20. I am unsure whether to greet someone I know only slightly.	0	1	2	3	4



### Appendix B Social Phobia Scale (SPS)

For each of the questions, please check a number to indicate the degree to which you feel the statement is characteristic or true of you. The rating scale is as follows:

0 = Not at all, 1 = Slightly, 2 = Moderately, 3 = Very, 4 = Extremely

1. I become anxious if I have to write in front of people.	0	1	2	3	4
2. I become self-conscious when using public toilets.	0	1	2	3	4
3. I can suddenly become aware of my own voice and of others listening to me.	0	1	2	3	4
4. I get nervous that people are staring at me as I walk down the street.	0	1	2	3	4
5. I fear I may blush when I am with others.	0	1	2	3	4
6. I feel self-conscious if I have to enter a room where others are already seated.	0	1	2	3	4
7. I worry about shaking or trembling when I'm watched by other people.	0	1	2	3	4
8. I would get tense if I had to sit facing other people on a bus or train.	0	1	2	3	4
9. I get panicky that others might see me faint or be sick or ill.	0	1	2	3	4
10. I would find it difficult to drink something in a group of people.	0	1	2	3	4
11. It would make me feel self-conscious to eat in front of a stranger in a restaurant.	0	1	2	3	4
12. I am worried people will think my behaviour is odd.	0	1	2	3	4
13. I would get tense if I had to carry a tray across a crowded cafeteria.	0	1	2	3	4
14. I worry I'll lose control of myself in front of other people.	0	1	2	3	4
15. I worry I might do something to attract the attention of other people.	0	1	2	3	4
16. When in an elevator, I am tense if people look at me.	0	1	2	3	4
17. I can feel conspicuous standing in a line	0	1	2	3	4
18. I can get tense when I speak in front of other people	0	1	2	3	4
19. I worry my head will shake or nod in front of others.	0	1	2	3	4
20. I feel awkward and tense if I know people are watching me.	0	1	2	3	4

**Appendix C**  
**Short Personal Report of Confidence as a Speaker Scale (PRCS-S-12)**

Please indicate whether each of the following statements is “true” or “false” in regards to yourself during public speaking situations. **Note:** 1= True, 0 = False.

1. My hands tremble when I try to handle objects on the platform. \_\_\_\_
2. I am in constant fear of forgetting my speech. \_\_\_\_
3. While preparing a speech I am in a constant state of anxiety. \_\_\_\_
4. My thoughts become confused and jumbled when I speak before an audience. \_\_\_\_
5. I prefer to have notes on the platform in case I forget my speech. \_\_\_\_
6. Although I talk fluently with friends I am at a loss for words on the platform. \_\_\_\_
7. The faces of my audience are blurred when I look at them. \_\_\_\_
8. I feel disgusted with myself after trying to address a group of people. \_\_\_\_
9. I perspire and tremble just before getting up to speak. \_\_\_\_
10. My posture feels strained and unnatural. \_\_\_\_
11. I am fearful and tense all the while I am speaking before a group of people. \_\_\_\_
12. I am terrified at the thought of speaking before a group of people. \_\_\_\_

**Appendix D**  
**Rumination Reflection Questionnaire – Rumination (RRQ-Rum)**

For each of the following statements, please indicate your level of agreement or disagreement by circling one of the scale categories to the right of each statement. Use the scale as shown below.

1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree

- |                                                                                                       |   |   |   |   |   |
|-------------------------------------------------------------------------------------------------------|---|---|---|---|---|
| 1. My attention is often focused on aspects of myself I wish I'd stop thinking about.                 | 1 | 2 | 3 | 4 | 5 |
| 2. I always seem to be rehashing in my mind recent things I've said or done.                          | 1 | 2 | 3 | 4 | 5 |
| 3. Sometimes it is hard for me to shut off thoughts about myself.                                     | 1 | 2 | 3 | 4 | 5 |
| 4. Long after an argument or disagreement is over with, my thoughts keep going back to what happened. | 1 | 2 | 3 | 4 | 5 |
| 5. I tend to "ruminate" or dwell over things that happen to me for a really long time afterward.      | 1 | 2 | 3 | 4 | 5 |
| 6. I don't waste time rethinking things that are over and done with.                                  | 1 | 2 | 3 | 4 | 5 |
| 7. Often I'm playing back over in my mind how I acted in a past situation.                            | 1 | 2 | 3 | 4 | 5 |
| 8. I often find myself reevaluating something I've done.                                              | 1 | 2 | 3 | 4 | 5 |
| 9. I never ruminate or dwell on myself for very long.                                                 | 1 | 2 | 3 | 4 | 5 |
| 10. It is easy for me to put unwanted thoughts out of my mind.                                        | 1 | 2 | 3 | 4 | 5 |
| 11. I often reflect on episodes in my life that I should no longer concern myself with.               | 1 | 2 | 3 | 4 | 5 |
| 12. I spend a great deal of time thinking back over my embarrassing or disappointing moments.         | 1 | 2 | 3 | 4 | 5 |

**Appendix E**  
**Social Anxiety Rumination Questionnaire – Trait (SARQ-T)**

Please rate the extent to which you agree or disagree with the following statements by circling the numbers that correspond with your answer choices. Please rate each statement with regards to how you *generally* think following social situations.

Items	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. I often think about social situations once they are over.	1	2	3	4	5
2. I find it difficult to forget about social events after they are over.	1	2	3	4	5
3. I often focus on the negative aspects of social events after they occur.	1	2	3	4	5
4. After social situations, I often think about how well it went.	1	2	3	4	5
5. After social situations occur, I often think about the event even when I do not want to.	1	2	3	4	5
6. After social encounters, I often think about how poorly the situation went.	1	2	3	4	5
7. After social events, I often think about the mistakes I made during the situation.	1	2	3	4	5
8. When I think about recent social events, I often think about other past failures.	1	2	3	4	5
9. After social situations, I replay the event over in my mind.	1	2	3	4	5
10. After social events, I often think about other similar past situations.	1	2	3	4	5
11. I experience reoccurring thoughts about social events long after they are over.	1	2	3	4	5
12. I often think about social situations in a repetitive manner.	1	2	3	4	5
13. After social situations, my thoughts about the event interfere with my ability to concentrate.	1	2	3	4	5
14. I repetitively think about specific aspects of social encounters after the event has occurred.	1	2	3	4	5
15. After social encounters, I tend to become entangled in my thoughts.	1	2	3	4	5
16. After social situations, I often experience distressing thoughts about the event.	1	2	3	4	5
17. After social situations, I often become overwhelmed by my thoughts.	1	2	3	4	5
18. My repetitive thoughts about recent social event affect my daily functioning.	1	2	3	4	5
19. I feel a sense of embarrassment when thinking about my recent social	1	2	3	4	5

encounters.					
20. I experience intrusive thoughts about the social situation after the event has occurred.	1	2	3	4	5
21. After social situations, I become very preoccupied by my thoughts.	1	2	3	4	5
22. I tend to rehash social situations in my mind.	1	2	3	4	5
23. It is easy for me to shut off my thoughts about recent social situations.	1	2	3	4	5
24. I dwell on social situations for a long time afterward.	1	2	3	4	5
25. I do not waste time thinking about social encounters once they are over.	1	2	3	4	5
26. I am easily able to put unwanted thoughts about social events out of my mind.	1	2	3	4	5
27. I often think about how I made a fool of myself after social events.	1	2	3	4	5
28. I often experience persistent thoughts about social situations after they are over.	1	2	3	4	5
29. I often engage in “self-dialogue” or “self-talk” about a social situation once it is over.	1	2	3	4	5

**Appendix F**  
**Anticipatory Social Behaviours Questionnaire (ASBQ)**

For the following statements, please rate the degree to which you typically engage in each behaviour, or experience each thought, prior to a social situation.

Items	Never	Almost Never	Almost Always	Always
1. I think about similar situations in which I have failed in the past.	1	2	3	4
2. I try to think of everything that could happen.	1	2	3	4
3. I imagine the worst that could happen.	1	2	3	4
4. I go over in detail what might happen.	1	2	3	4
5. I try to picture how I will appear to others.	1	2	3	4
6. I try to plan what I am going to say.	1	2	3	4
7. I rehearse conversations in my mind.	1	2	3	4
8. I remind myself of things I should not do.	1	2	3	4
9. I think about ways in which I could put things right if I make a fool of myself.	1	2	3	4
10. I think about ways in which I could avoid having to face the situation.	1	2	3	4
11. I think about ways in which I could escape from the situation if it gets too embarrassing.	1	2	3	4
12. I make a conscious effort not to think about the situation.	1	2	3	4

**Appendix G**  
**Trait Self-Focused Attention Questionnaire (TSFAQ)**

Please use the following rating scale to respond to the items below:

<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	
<b>Not at all</b>	<b>Somewhat</b>	<b>To a moderate degree</b>	<b>Mostly</b>	<b>Totally</b>	
<b>While in social situations, I typically focus on...</b>					
1. What I should say or do next.	0	1	2	3	4
2. The impression I am making on the other person.	0	1	2	3	4
3. My level of anxiety.	0	1	2	3	4
4. My internal bodily reaction (for example, heart rate).	0	1	2	3	4
5. On past social failures.	0	1	2	3	4
6. Whether my heart is beating fast.	0	1	2	3	4
7. Whether I am behaving tensely.	0	1	2	3	4
8. Whether I am in control of my breathing.	0	1	2	3	4
9. Whether I look tense.	0	1	2	3	4
10. Whether I am blushing, trembling, or sweating.	0	1	2	3	4
11. How tense I feel.	0	1	2	3	4
12. Whether I have sufficient social skills.	0	1	2	3	4
13. Whether I am speaking fluently.	0	1	2	3	4
14. How well I am taking part in the social interaction.	0	1	2	3	4
15. Whether I am behaving appropriately.	0	1	2	3	4
16. Whether I understand what the other person is saying.	0	1	2	3	4

**Appendix H**  
**Social Phobia Safety Behaviours Scale (SPSBS)**

Please evaluate how frequently you use each of the following behaviours while in a social situation.

<b>Statement</b>	<b>Never</b>	<b>Occasionally</b>	<b>Often</b>	<b>Usually</b>
1. Looking away from or avoiding eye contact with the person with whom you are interacting.	1	2	3	4
2. Speeding up your speech, talking quickly and without pauses.	1	2	3	4
3. Shortening your speech, drastically reducing what you have to say.	1	2	3	4
4. Avoiding attracting attention to yourself.	1	2	3	4
5. Getting a seat as hidden as you can.	1	2	3	4
6. Pretending you are not interested or you are distant from what is happening.	1	2	3	4
7. Limiting yourself to being a passive spectator of a situation.	1	2	3	4
8. Pretending you did not see someone.	1	2	3	4
9. Walking with your head down.	1	2	3	4
10. Putting your hands in your pockets	1	2	3	4
11. Stopping doing what you were doing (e.g. writing, drinking, etc.) while being observed.	1	2	3	4
12. Trying to look at ease.	1	2	3	4
13. Laughing to hide the fact that you are nervous.	1	2	3	4
14. Constantly checking if you are presentable.	1	2	3	4
15. Increasing the distance between yourself and the person you are talking to.	1	2	3	4
16. Trying to disguise your trembling.	1	2	3	4
17. Thinking very carefully about what you are going to say before you speak.	1	2	3	4



**Appendix I**  
**Anxiety Sensitivity Index – 3 (ASI-3)**

Please choose the number that best corresponds to how much you agree with each item. If any items concern something that you have never experienced (e.g., fainting in public), then answer on the basis of how you think you might feel *if you had* such an experience. Otherwise, answer all items on the basis of your own experience. Be careful to choose only one number for each item and please answer all items.

	<b>Very little</b>	<b>A little</b>	<b>Some</b>	<b>Much</b>	<b>Very much</b>
1. It is important for me not to appear nervous.	0	1	2	3	4
2. When I cannot keep my mind on a task, I worry that I might be going crazy.	0	1	2	3	4
3. It scares me when my heart beats rapidly.	0	1	2	3	4
4. When my stomach is upset, I worry that I might be seriously ill.	0	1	2	3	4
5. It scares me when I am unable to keep my mind on a task.	0	1	2	3	4
6. When I tremble in the presence of others, I fear what people might think of me.	0	1	2	3	4
7. When my chest feels tight, I get scared that I won't be able to breathe properly.	0	1	2	3	4
8. When I feel pain in my chest, I worry that I'm going to have a heart attack.	0	1	2	3	4
9. I worry that other people will notice my anxiety.	0	1	2	3	4
10. When I feel "spacey" or spaced out I worry that I may be mentally ill.	0	1	2	3	4
11. It scares me when I blush in front of people.	0	1	2	3	4
12. When I notice my heart skipping a beat, I worry that there is something seriously wrong with me.	0	1	2	3	4
13. When I begin to sweat in a social situation, I fear people will think negatively of me.	0	1	2	3	4
14. When my thoughts seem to speed up, I worry that I might be going crazy.	0	1	2	3	4
15. When my throat feels tight, I worry that I could choke to death.	0	1	2	3	4
16. When I have trouble thinking clearly, I worry that there is something wrong with me.	0	1	2	3	4
17. I think it would be horrible for me to faint in public.	0	1	2	3	4
18. When my mind goes blank, I worry there is something terribly wrong with me.	0	1	2	3	4

**Appendix J****Alcohol Use Questionnaire (National Institute on Alcohol Abuse and Alcoholism, 2003)**

1. During the last 12 months, how often did you usually have any kind of drink containing alcohol? **By a drink we mean half an ounce of absolute alcohol (e.g. a 12 ounce can or glass of beer or cooler, a 5 ounce glass of wine, or a drink containing 1 shot of liquor).** Choose only one.

- Every day
- 5 to 6 times a week
- 3 to 4 times a week
- twice a week
- once a week
- 2 to 3 times a month
- once a month
- 3 to 11 times in the past year
- 1 or 2 times in the past year
- I did not drink any alcohol in the past year, but I did drink in the past
- I never drank any alcohol in my life

2. During the last 12 months, how many alcoholic drinks did you have on a typical day when you drank alcohol?

- 25 or more drinks
- 19 to 24 drinks
- 16 to 18 drinks
- 12 to 15 drinks
- 9 to 11 drinks
- 7 to 8 drinks
- 5 to 6 drinks
- 3 to 4 drinks
- 2 drinks
- 1 drink

3. During the last 12 months, how often did you have 5 or more (males) or 4 or more (females) drinks containing any kind of alcohol in within a two-hour period? [That would be the equivalent of at least 5 (4) 12-ounce cans or bottles of beer, 5 (4) five ounce glasses of wine, 5 (4) drinks each containing one shot of liquor or spirits. Choose only one:

- Every day
- 5 to 6 days a week
- 3 to 4 days a week
- two days a week
- one day a week
- 2 to 3 days a month
- one day a month
- 3 to 11 days in the past year
- 1 or 2 days in the past year

### Appendix K Modified Drinking Motives Questionnaire – Revised (M-DMQ-R)

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

Please respond based on how you usually have felt or behaved <b>over the past several years.</b>	Almost never/ Never	Some of the time	Half of the time	Most of the time	Almost always/ Always
1. As a way to celebrate	1	2	3	4	5
2. To relax	1	2	3	4	5
3. Because I like the feeling	1	2	3	4	5
4. Because it is what most of my friends do when we get together	1	2	3	4	5
5. To forget my worries	1	2	3	4	5
6. Because it is exciting	1	2	3	4	5
7. To be social	1	2	3	4	5
8. Because I feel more self-confident or sure of myself	1	2	3	4	5
9. To get a high	1	2	3	4	5
10. Because it is customary on special occasions	1	2	3	4	5
11. Because it helps me when I am feeling nervous	1	2	3	4	5
12. Because it's fun	1	2	3	4	5
13. Because it makes a social gathering more enjoyable	1	2	3	4	5
14. To cheer me up when I'm in a bad mood	1	2	3	4	5
15. To be liked	1	2	3	4	5
16. To numb my pain	1	2	3	4	5
17. Because it helps me when I am feeling depressed	1	2	3	4	5
18. So that others won't kid me about not using	1	2	3	4	5
19. To reduce my anxiety	1	2	3	4	5
20. To stop me from dwelling on things	1	2	3	4	5
21. To turn off negative thoughts about myself	1	2	3	4	5
22. To help me feel more positive about things in my life	1	2	3	4	5
23. To stop me from feeling so hopeless about the future	1	2	3	4	5
24. Because my friends pressure me to use	1	2	3	4	5
25. To fit in with a group I like	1	2	3	4	5
26. Because it makes me feel good	1	2	3	4	5
27. To forget painful memories	1	2	3	4	5
28. So I won't feel left out	1	2	3	4	5

**Appendix L**  
**Rutgers Alcohol Problem Index (RAPI) (23-item version)**

Different things happen to people while they are drinking ALCOHOL or because of their ALCOHOL drinking. Several of these things are listed below. Indicate how many times each of these things happened to you WITHIN THE LAST YEAR.

Use the following code:

0 = None

1 = 1-2 times

2 = 3-5 times

3 = More than 5 times

**HOW MANY TIMES HAS THIS HAPPENED TO YOU WHILE YOU WERE DRINKING OR BECAUSE OF YOUR DRINKING DURING THE LAST YEAR?**

- 0 1 2 3 Not able to do your homework or study for a test
- 0 1 2 3 Got into fights with other people (friends, relatives, strangers)
- 0 1 2 3 Missed out on other things because you spent too much money on alcohol
- 0 1 2 3 Went to work or school high or drunk
- 0 1 2 3 Caused shame or embarrassment to someone
- 0 1 2 3 Neglected your responsibilities
- 0 1 2 3 Relatives avoided you
- 0 1 2 3 Felt that you needed more alcohol than you used to in order to get the same effect
- 0 1 2 3 Tried to control your drinking (tried to drink only at certain times of the day or in certain places, that is, tried to change your pattern of drinking)
- 0 1 2 3 Had withdrawal symptoms, that is, felt sick because you stopped or cut down on drinking
- 0 1 2 3 Noticed a change in your personality
- 0 1 2 3 Felt that you had a problem with alcohol
- 0 1 2 3 Missed a day (or part of a day) of school or work
- 0 1 2 3 Wanted to stop drinking but couldn't
- 0 1 2 3 Suddenly found yourself in a place that you could not remember getting to
- 0 1 2 3 Passed out or fainted suddenly
- 0 1 2 3 Had a fight, argument or bad feeling with a friend
- 0 1 2 3 Had a fight, argument or bad feeling with a family member
- 0 1 2 3 Kept drinking when you promised yourself not to
- 0 1 2 3 Felt you were going crazy
- 0 1 2 3 Had a bad time
- 0 1 2 3 Felt physically or psychologically dependent on alcohol
- 0 1 2 3 Was told by a friend, neighbor or relative to stop or cut down drinking

### Appendix M Repetitive Thinking Questionnaire (RTQ)

Please think about the last time you felt especially upset or distressed.

Now answer the following questions in relation to the situation you have just thought of. How true (1-5) are each of these statements with respect to your experience **after the situation?**

1 Not true at all	2	3 Somewhat true	4	5 Very true	
1. I had thoughts or images about the situation that occurred over and over again, that resulted in my feelings getting worse and worse.	1	2	3	4	5
2. There was nothing more I could do about the situation, so I didn't think about it anymore.	1	2	3	4	5
3. I listened to sad music	1	2	3	4	5
4. I had thoughts or images about turning the clock back to do something again, but doing it better.	1	2	3	4	5
5. I had thoughts or images about all my shortcomings, failings, faults, mistakes.	1	2	3	4	5
6. I went some place alone to think about my feelings.	1	2	3	4	5
7. My thoughts overwhelmed me	1	2	3	4	5
8. I had thoughts or images like " <i>Why do I have problems other people don't have?</i> "	1	2	3	4	5
9. When I was under pressure, I thought a lot about the situation	1	2	3	4	5
10. I had thoughts or images about a past event that came into my head even when I did not wish to think about it again	1	2	3	4	5
11. I had thoughts or images that " <i>I won't be able to do my job/work because I feel so badly.</i> "	1	2	3	4	5
12. I went away by myself and thought about why I felt this way.	1	2	3	4	5
13. I had thoughts or images about the situation that resulted in me avoiding similar situations and that reinforced a decision to avoid similar situations.	1	2	3	4	5
14. I found it easy to dismiss distressing thoughts about the situation	1	2	3	4	5
15. I had thoughts or images like " <i>Why can't I get going?</i> "	1	2	3	4	5
16. I had thoughts or images of the situation that were difficult to forget.	1	2	3	4	5
17. I was always thinking about something.	1	2	3	4	5
18. I didn't tend to think about it (the situation)	1	2	3	4	5
19. Once I started thinking about the situation, I couldn't stop.	1	2	3	4	5
20. I didn't have enough time to do everything, so I didn't think about it	1	2	3	4	5
21. I had thoughts or images about how alone I felt.	1	2	3	4	5

22. I had a lot of thoughts or images of the situation after it was over.	1	2	3	4	5
23. I noticed that I had been thinking about the situation.	1	2	3	4	5
24. I had thoughts or images of the situation that I tried to resist thinking about.	1	2	3	4	5
25. I had thoughts or images about how angry I was with myself.	1	2	3	4	5
26. I thought about the situation all the time.	1	2	3	4	5
27. I thought about the situation until it was all done	1	2	3	4	5
28. I knew I shouldn't have thought about the situation, but I couldn't help it	1	2	3	4	5
29. I had thoughts or images asking " <i>Why do I always react this way?</i> "	1	2	3	4	5
30. I had thoughts or images about the situation and wishing it had gone better.	1	2	3	4	5
31. The situation really made me think	1	2	3	4	5

### Appendix N Demographic Questionnaire

Please answer the following questions listed below by writing your response or checking the most appropriate answer.

1. What is your age? \_\_\_\_\_
  
2. What is your biological sex?
  - Male
  - Female
  - Other
  
3. Which ethnicity do you most closely identify with?
  - White/Caucasian
  - Asian
  - Black/African Canadian
  - First Nations
  - Other  Please specify \_\_\_\_\_
  
4. What is your current level of education? (Please choose one)
  - University Year 1
  - University Year 2
  - University Year 3
  - University Year 4
  - University Year 5 (or more)
  
5. Are you completing your Psychology:
  - Major
  - Minor
  - Neither
  
6. What is your occupational status?
 

Full time Student <input type="checkbox"/>	Part time Student <input type="checkbox"/>	Full time Employee <input type="checkbox"/>
Part time Employee <input type="checkbox"/>	Unemployed <input type="checkbox"/>	Other: _____
  
7. What is your marital status?
 

Married <input type="checkbox"/>	Separated <input type="checkbox"/>	Divorced <input type="checkbox"/>
Cohabiting <input type="checkbox"/>	Single <input type="checkbox"/>	Widowed <input type="checkbox"/>

**Appendix O**  
**Liebowitz Social Anxiety Scale – Self Report – Social Avoidance Subscale (LSAS-SR-SA)**

Please read each situation carefully and indicate how often (0 to 3) you **avoid** the situation. If you come across a situation that you ordinarily do not experience, we ask that you imagine ‘what if you were faced with that situation’, and then rate how often you would tend to avoid it. Please base your ratings on the way that the situations have affected you in the last week.

Items	Never (0%)	Occasionally (1-33%)	Often (34-67%)	Severe (68-100%)
1. Telephoning in public.	0	1	2	3
2. Participating in small groups.	0	1	2	3
3. Eating in public places.	0	1	2	3
4. Drinking with others in public places.	0	1	2	3
5. Talking to people in authority.	0	1	2	3
6. Acting, performing or giving a talk in front of an audience.	0	1	2	3
7. Going to a party.	0	1	2	3
8. Working while being observed.	0	1	2	3
9. Writing while being observed.	0	1	2	3
10. Calling someone you don't know very well.	0	1	2	3
11. Talking with people you don't know very well.	0	1	2	3
12. Meeting strangers.	0	1	2	3
13. Urinating in a public bathroom.	0	1	2	3
14. Entering a room when others are already seated.	0	1	2	3
15. Being the center of attention.	0	1	2	3
16. Speaking up at a meeting.	0	1	2	3
17. Taking a test.	0	1	2	3
18. Expressing a disagreement or disapproval to people.	0	1	2	3
19. Looking at people you don't know very well.	0	1	2	3
20. Giving a report to a group.	0	1	2	3
21. Trying to pick up someone.	0	1	2	3
22. Returning goods to a store.	0	1	2	3
23. Giving a party.	0	1	2	3
24. Resisting a high pressure salesperson.	0	1	2	3



**Appendix P**  
**Depression Anxiety Stress Scale – 21 (DASS-21)**

# DASS<sub>21</sub>

*Name:*

*Date:*

Please read each statement and circle a number 0, 1, 2 or 3 which indicates how much the statement applied to you *over the past week*. There are no right or wrong answers. Do not spend too much time on any statement.

*The rating scale is as follows:*

- 0 Did not apply to me at all
- 1 Applied to me to some degree, or some of the time
- 2 Applied to me to a considerable degree, or a good part of time
- 3 Applied to me very much, or most of the time

1	I found it hard to wind down	0	1	2	3
2	I was aware of dryness of my mouth	0	1	2	3
3	I couldn't seem to experience any positive feeling at all	0	1	2	3
4	I experienced breathing difficulty (eg, excessively rapid breathing, breathlessness in the absence of physical exertion)	0	1	2	3
5	I found it difficult to work up the initiative to do things	0	1	2	3
6	I tended to over-react to situations	0	1	2	3
7	I experienced trembling (eg, in the hands)	0	1	2	3
8	I felt that I was using a lot of nervous energy	0	1	2	3
9	I was worried about situations in which I might panic and make a fool of myself	0	1	2	3
10	I felt that I had nothing to look forward to	0	1	2	3
11	I found myself getting agitated	0	1	2	3
12	I found it difficult to relax	0	1	2	3
13	I felt down-hearted and blue	0	1	2	3
14	I was intolerant of anything that kept me from getting on with what I was doing	0	1	2	3
15	I felt I was close to panic	0	1	2	3
16	I was unable to become enthusiastic about anything	0	1	2	3
17	I felt I wasn't worth much as a person	0	1	2	3

18	I felt that I was rather touchy	0	1	2	3
19	I was aware of the action of my heart in the absence of physical exertion (eg, sense of heart rate increase, heart missing a beat)	0	1	2	3
20	I felt scared without any good reason	0	1	2	3
21	I felt that life was meaningless	0	1	2	3

More information on the DASS can be found at [www.psy.unsw.edu.au/dass/](http://www.psy.unsw.edu.au/dass/)

## **Appendix Q INFORMED CONSENT**

Dear potential participant:

You are invited to participate in a research study. The general purpose of this study is to better understand the relationship between undergraduate alcohol use and various thought processes and feelings that some individuals experience in response to social situations. Although the exact purpose of the research study cannot be explained fully at this time, a full explanation will be provided to you once you have completed the study. This research is being investigated by a Lakehead University Master of Arts student, Victoria Pitura, under the supervision of Assistant Professor, Dr. Amanda Maranzan. The study is being funded by a Joseph-Armand Bombardier Canada Graduate Scholarship and an Ontario Graduate Scholarship, which were awarded to the student researcher, Victoria Pitura.

### **INFORMATION**

This research study consists of one online survey, which will be completed individually by participants. To participate in this study you must have consumed alcohol at least once during the past 12 months. During study completion you will be asked to complete several questionnaires regarding your demographics (i.e., age, gender, etc.), alcohol use, and thoughts and feelings regarding social situations. The entire study should take approximately 60 minutes to complete. Approximately 200 undergraduate students will be recruited through the school's undergraduate psychology participant pool.

### **RISKS**

As a result of participating in this research, you may experience feelings of discomfort or embarrassment. However, these feelings are normal and should only be temporary. If these feelings persist or worsen, or you have any concerns, you may contact Lakehead University's Counseling Services. **Lakehead University's Counseling Services** can be reached by phone at (807) 343-8361 and in person at UC1007. Also, you can contact the **GOOD2TALK** helpline at 1-(866)-925-5454 or visit <http://anxiety.stjoes.ca/socialphobia.htm> and <http://www.niaaa.nih.gov/alcohol-health> for more information. Please note that although various data are being collected during this study, the information you provide will be stored and analyzed separately from any identifying information.

### **BENEFITS**

This research will benefit the research community, as well as those undergraduates/young adults who experience anxiety during social situations and negative consequences as a result of drinking. Research examining these factors in undergraduates is limited. By expanding this field, researchers may gain a better understanding of, and thereby determine more effective interventions for problems associated with alcohol use and feelings of anxiety during social situations.

### **COMPENSATION**

Your participation in this study will be accredited with 1.00 course credits.

### **CONFIDENTIALITY**

All data collected and participation in this study will remain confidential. The student researcher, Victoria Pitura, and the principal investigator, Dr. Amanda Maranzan, will be the only individuals with access to the data. The study will be hosted on a survey hosting website called Survey

Monkey; all data will be treated as private and will not be shared with anyone else except in extreme circumstances (e.g., being compelled by subpoena; invocation of the US Patriot Act). You can read more about Survey Monkey's privacy policy here:

<https://www.surveymonkey.com/mp/policy/privacy-policy/>.

Additionally, all data will be retained in password protected electronic files. Although you will be asked to provide your name and student ID, this information will *only* be used in the allocation of research participation credits and/or contact purposes and will be stored separately from all additional study data. This means that you will not be able to withdraw your data from the study once it is submitted, as all information will be anonymous. Furthermore, all data obtained in this study will be destroyed by the principal investigator or student researcher by no later than August 31, 2019 (i.e., after five years). While the results of this study may be published or presented to colleagues, all data will be presented in aggregate form.

### **CONTACT**

Should you have questions at any time regarding the study or its procedures, you may contact the student researcher, Victoria Pitura, by email at [vpitura1@lakeheadu.ca](mailto:vpitura1@lakeheadu.ca). Should you experience adverse effects as a result of participating in this study, you may contact the principal investigator, Dr. Amanda Maranzan, by email at [kamaranz@lakeheadu.ca](mailto:kamaranz@lakeheadu.ca), by phone at (807) 343-8322, and in person at SN1018. This project has been reviewed and approved by the University Research Ethics Board (REB # 067 14-15). If you feel you have not been treated according to the descriptions in this form, or your rights as a participant in research have been violated during the course of this project, you may contact Lakehead University's Research Ethics Coordinator, Rebecca Scott, by email at [rkscott1@lakeheadu.ca](mailto:rkscott1@lakeheadu.ca), or by phone at (807) 343-8933.

### **PARTICIPATION**

Your participation in this study is voluntary and you may decline to participate at any time without penalty. You may also decline to answer a question at any time. Should you choose to participate, **you may withdraw from the study at any time, prior to submitting your responses, without penalty or loss of benefits to which you are otherwise entitled (i.e., you will still receive bonus point credit).** You have the right to omit any questionnaire items that you choose.

### **FEEDBACK AND PUBLICATION**

You will receive feedback regarding this research via email. E-mails will be sent to you upon request, from the student researcher no later than August 31, 2015. This research will be reported in the student researcher's master's thesis, as well as presented in Lakehead University's "Attending Master's Research Seminar (PSYC 9901)". It is also possible that this research may be presented at conferences and submitted and accepted in a scientific journal. However, all data will only be presented in aggregate form.

**CONSENT**

I have read and understand the above information.

I agree to participate in this study.

I understand the potential risks (i.e., temporary feelings of discomfort or embarrassment) and/or benefits of the study (benefiting the research community and young adults experiencing social anxiety and/or problems associated with drinking).

I am a volunteer and can withdraw from the study at any time and/or choose not to answer any question. However, as the information that I provide is anonymous, I understand that I will not be able to withdraw any information from the study after I submit it.

The data I provide will be securely stored at Lakehead University for a minimum of 5 years. Final research findings will be made available to me via email, at my request, by no later than August 31, 2015.

I will remain anonymous in any publications/public presentation of the research findings and my identity will not be revealed.

I **agree** with the above statements.

I **disagree** with the above statements.

**Appendix R**  
**DEBRIEFING FORM**

**Anxiety and Alcohol Use in Undergraduate Students**

Victoria Pitura and Dr. Amanda Maranzan, Department of Psychology

The information obtained in this form is very important to read and it is recommended that you save a copy of this form for your records.

You were deemed eligible to participate in this study based on your reported consumption of alcohol at least once within the last 12 months. During the study, you were asked to complete a number of measures regarding your alcohol use, as well as a number of measures used to assess variables commonly associated with social anxiety. Interestingly, while the relationship between social anxiety and problematic alcohol use is strongly supported in research involving clinical populations, relatively little is understood about this relationship among young adult, non-clinical, populations. Given that many young adults begin or continue to consume alcohol during the university/college years, it is particularly important to gain a better understanding of the relationship between social anxiety and problematic drinking in this population.

While many undergraduate students may report drinking alcohol at some point, not all individuals consume alcohol for the same reasons, and not all report experiencing negative consequences as a result of their drinking. More specifically, those who consume alcohol as a way to cope with negative emotions or to conform to the social expectations of others (commonly referred to as negative drinking motives), are often found to experience more alcohol-related problems than those who consume alcohol for social (i.e. at a party) or enhancement (i.e. to feel happier) purposes (Cooper, 1994). Some examples may include missing school or work, getting into fights with others, or feeling physically or psychologically dependent on alcohol. While socially anxious individuals are often found to consume lower levels of alcohol than their non-anxious counterparts, research has also found such individuals to frequently experience alcohol-related problems as a result of even their limited alcohol use (see Morris, Stewart, & Ham, 2005 for a review). Furthermore, these individuals have been found to hold more negative drinking motives (i.e., drinking to cope or to conform), and such motives may therefore serve to explain the relationship between elevated social anxiety and alcohol-related problems among these individuals. The current study therefore aimed to determine whether negative drinking motives serve to explain the relationship between social anxiety and alcohol-related problems in undergraduate students.

Aside from alcohol use, individuals with social anxiety also frequently engage in a number of mental and behavioural processes, which may unintentionally serve to maintain social anxiety over time. During the social situation, socially anxious individuals commonly report greater use of safety behaviours, which are strategies the individual uses in an attempt to reduce or avoid feelings of anxiety (e.g., avoiding eye contact or avoiding others). Additionally, these individuals engage in various forms of repetitive negative thinking, including: self-focused attention (i.e., increased focus on internal feelings and sensations), rumination (repeatedly and negatively reflecting on feelings of distress), post-event processing (rumination specifically following an anxiety provoking social event), and anticipatory processing (repeatedly reflecting on past social failures and anticipating and preparing for future social events).

Another factor that has been more recently considered in relation to social anxiety is an individual difference/personality variable known as anxiety sensitivity. Individuals who possess high levels of anxiety sensitivity tend to be overly fearful of experiencing anxiety-related symptoms or bodily sensations, because of an inherent belief that such sensations will result in harmful physical, mental/psychological, or social consequences (Reiss & McNally, 1985; Reiss, 1991). For example, the individual may fear that feelings of anxiety will lead to them fainting, going crazy, or appearing anxious to others. Individuals who experience elevated levels of anxiety frequently score higher on measures of anxiety sensitivity, and while this may also be true of those specifically with social anxiety, more research on this topic is necessary. The current study therefore sought to determine whether higher levels of anxiety sensitivity are positively associated with levels of social anxiety, as well as with each of the abovementioned social anxiety-maintaining factors (i.e., self-focused attention, safety behaviours, anticipatory processing, post-event processing, and rumination).

Interestingly, research has also examined the association between anxiety sensitivity and aspects of problematic drinking such as negative drinking motives and alcohol-related problems. Findings suggest that elevated anxiety sensitivity may be associated with both coping and conformity motives for drinking, as well as with greater reports of alcohol-related problems (Harwell, Cellucci, & Lovering Iwata, 2011; Howell, Leyro, Hogan, Buckner, & Zvolensky, 2010). Additionally, research has considered the role of rumination and found that higher levels of anxiety sensitivity are associated with higher engagement in rumination, which is then associated with coping-motivated drinking (Harwell et al., 2011). Given the role of rumination in maintaining social anxiety, it may also be useful to examine whether each of the other social anxiety-maintaining factors assist in explaining the relationship between Anxiety Sensitivity and problematic alcohol use. Another purpose of this study was therefore to determine whether each of the social anxiety-maintaining factors (i.e., self-focused attention, safety behaviours, anticipatory processing, post-event processing, and rumination) served to explain the relationship between anxiety sensitivity and negative drinking motives among undergraduates.

### **Procedure:**

At the beginning of the study, participants were asked to complete a screening item ensuring study eligibility (i.e., must have consumed alcohol at least once in the past 12 months). This question was Item 1 from the *Alcohol Use Questionnaire*. Ineligible participants were not permitted and were redirected to this debriefing form. All eligible participants were permitted to continue with the remaining study assessment measures. These included: a *demographic questionnaire*, *Social Interaction Anxiety Scale*, *Social Phobia Scale*, *Short Personal Report of Confidence as a Speaker Scale*, *Rumination Reflection Questionnaire – Rumination*, *Social Anxiety Rumination Questionnaire – Trait*, *Anticipatory Social Behaviours Questionnaire*, *Trait Self-focused Attention Questionnaire*, *Repetitive Thinking Questionnaire*, *Social Phobia Safety Behaviour Scale*, *Anxiety Sensitivity Index - 3*, *Modified Drinking Motives Questionnaire – Revised*, *Rutgers Alcohol Problem Index*, *Liebowitz Social Anxiety Scale – Self-Report – Social Avoidance Subscale*, and *Depression Anxiety Stress Scale - 21*.

Overall, the purpose of this study was to gain a better understanding of the complex relationships that exist among various factors related to both social anxiety and problematic alcohol use, in undergraduate students. As such, participants' scores on most of the aforementioned measures will be examined in order to determine whether associations exist among the variables. It is expected that there will be positive correlations between social anxiety, social anxiety-maintaining factors (i.e., rumination,

post-event processing, anticipatory processing, self-focused attention, general tendency to engage in repetitive negative thinking, and use of safety behaviours), alcohol-related problems, negative drinking motives (i.e., coping and conformity), and anxiety sensitivity. Alternatively, there will be negative relationships between social anxiety and alcohol use (quantity/frequency), as well as between SA-maintaining factors and alcohol use (quantity/frequency).

We will also examine whether negative drinking motives mediate, and thereby serve to clarify, the relationship between social anxiety and alcohol-related problems. It is expected that participants' reported levels of social anxiety would have an indirect effect on their reported experiences of alcohol-related problems, through use of both coping and conformity motives. Next, we will examine whether each of the social-anxiety maintaining factors serve to mediate the relationship between anxiety sensitivity and negative drinking motives. It is expected that participants' levels of anxiety sensitivity will have an indirect effect on their use of negative drinking motives, through their engagement in one type of negative repetitive thinking, rumination. Given that post-event processing, self-focused attention, and anticipatory processing are also forms of repetitive negative thinking it is also expected that each of these factors will mediate the relationship between anxiety sensitivity and negative drinking motives.

It is worth noting that although participants were asked to complete a questionnaire regarding symptoms of depression, this was not included as a main measure in this study. Depression sometimes co-occurs with symptoms of anxiety and levels of depression were therefore assessed in order to statistically control for the effect of depressive symptoms on our final results. Additionally, participants were asked to complete demographic information, which will also not be included in our main analyses. The purpose of these items was simply to examine and therefore account for any pre-existing demographic differences among participants.

Thank you for participating in this study. A summary of the study and its results will be e-mailed to you no later than August 31, 2015.

Participation in this study may have led to some feelings of discomfort or embarrassment. However, these feelings are normal and should only be temporary. If they persist or worsen, or you have any concerns, you may contact the researchers or Lakehead University's Counseling Services (contact information provided below).

If you have any questions or comments regarding this study, or your participation in this study, please contact:

**Victoria Pitura**  
Department of Psychology  
Lakehead University  
E-mail: [vpitura1@lakeheadu.ca](mailto:vpitura1@lakeheadu.ca)

**Dr. Amanda Maranzan**  
Department of Psychology  
Lakehead University  
E-mail: [kamaranz@lakeheadu.ca](mailto:kamaranz@lakeheadu.ca)  
Phone: (807) 343-8322  
Office: SN1018

This study was reviewed and approved by the Research Ethics Board (REB # 067 14-15).



If you feel your rights as a participant in research have been violated during the course of this project, you may contact Lakehead University's Research Ethics Coordinator, Rebecca Scott, by email at [rkscott1@lakeheadu.ca](mailto:rkscott1@lakeheadu.ca), or by phone at (807) 343-8933.

If you would like to discuss or learn more about social anxiety or alcohol use, please refer to the following list of resources:

**Counseling Services**

Lakehead University  
955 Oliver Road  
Thunder Bay, Ontario, P7B 5E1  
(807) 343-8361  
<https://www.lakeheadu.ca/current-students/student-services/tb/health-and-counselling>

**GOOD2TALK**

Post-Secondary Student Helpline  
Ontario  
1-(866)-925-5454

**St. Joseph's Healthcare**

Anxiety Treatment and Research Centre  
<http://anxiety.stjoes.ca/socialphobia.htm>

**National Institute on Alcohol Abuse and  
Alcoholism**

<http://www.niaaa.nih.gov/alcohol-health>