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### Abstract

In young adults at university, social interaction anxiety has been linked to elevated risk of alcohol-related problems, as has alexithymia. The present study sought to assess whether social interaction anxiety is, like alexithymia, associated with the primary drinking motive of drinking to cope with negative affect. There were 126 undergraduates (76 females, 50 males), aged 18-25 years, who were recruited from two southeast Queensland universities to complete validated self-report measures of problematic drinking, alexithymia, drinking motives, and social interaction anxiety. As predicted, social interaction anxiety was positively related to problematic drinking and coping motives for drinking. Alexithymia mediated the relationship of social interaction anxiety with coping motives. Findings were consistent with a developmental hypothesis of the links between social anxiety, alexithymia, and drinking motives. Given the cross-sectional design of the current study, longitudinal research is ultimately needed to confirm such interpretations of alexithymia and alcohol use among socially anxious young adults at university.

Keywords: alcohol, social anxiety, alexithymia, drinking motives

## Introduction

Social Anxiety Disorder (SAD) is the fourth most common psychiatric disorder in the world (Ruscio et al., 2008), and shows high comorbidity with alcohol use disorder (AUD). Nearly half of those with a lifetime diagnosis of SAD may also meet criteria for AUD - with SAD typically preceding AUD onset (Buckner & Turner, 2009; Grant et al., 2005) - compared to a lifetime prevalence of 14% for AUD in the general population (Kessler et al., 2005). Social anxiety has thus been suggested as a causal factor contributing to problematic drinking, though some inconsistencies in relevant research findings have been noted (Morris, Stewart & Ham, 2005). Even subclinical levels of social anxiety are reportedly associated with alcohol problems among university students (Kairouz, Kliksman, Demers & Adlaf, 2002; Schry & White, 2013; Thomas, Randall & Carrigan, 2003), presumably because alcohol is reliably anxiolytic (Abrams, Kushner, Medina & Voight, 2001, 2002; Thomas et al., 2007). Buckner et al. (2008) found that social anxiety in a sample of 1709 adolescents was a unique risk factor for AUD at 14 years follow-up. Similarly, Gilles, Turk and Fresco (2006) reported that social anxiety was a significant predictor of alcohol-related problems and dependence, but not alcohol consumption - presumably reflecting high overall drinking levels - in a sample of university undergraduates. Some research has even indicated a negative relationship of social anxiety with alcohol consumption in university students despite the positive relationship of social anxiety with alcohol problems when alcohol is consumed; the negative relationship with consumption may simply reflect avoidance of social settings where alcohol is typically consumed at university (Schry & White, 2013).

Risky or problematic alcohol use is reportedly more prevalent among young adult university students than among non-students of the same age (Kypri, Cronin & Wright, 2005),

and can affect students academically (Aertgeerts & Buntinx, 2002; Singleton & Wolfson, 2009), put them at risk of physical injury (Roche & Watt, 1999), erode adulthood transition skills (Zeigler et al., 2005), and predict future alcohol related problems and dependence (Jennison, 2004). The social environment of university life is often invoked to account for high rates of risky drinking by students (Borsari, Murphy & Barnett, 2007; Casswell, Pledger & Pratap, 2002; Van Damme et al., 2013). However, not all students respond to the unique social environment and associated drinking culture at university by drinking at problematic levels (Nelson et al., 2009). Cooper (1994) identified four distinct alcohol use motives: enhancement (drinking for positive affect, e.g., to “get high”), social (drinking to be sociable, e.g., at parties), conformity (drinking to fit in with others), and coping (drinking to reduce negative affect such as anxiety and stress). Of these four motives, drinking to cope reflects a maladaptive, avoidance coping strategy (Feil & Hasking, 2008) that predicts future alcohol-related problems (Kuntsche et al., 2005). Drinking to cope is likely to have special relevance to those at university who suffer from social anxiety; this type of drinking motive has also been found to be associated with alexithymia in young adults (Lyvers, Coundouris, Edwards & Thorberg, 2018).

Alexithymia, a personality trait characterized by difficulties in identifying and describing emotions and externalized thinking, has been consistently linked to both problematic drinking and social anxiety. In clinical samples of clients with AUD, 30-67% were highly alexithymic (Cruise & Becerra, 2018; Thorberg et al., 2009) compared to only 9-13% of the general population (Franz et al., 2008; Karukivi et al., 2010; Mattila, Salminen, Nummi & Joukamaa, 2006). Similarly, in clinical samples of clients with SAD, 28-58% were reported to be highly alexithymic (Cox, Swinson, Shulman & Bourdeau, 1995; Fukunishi et al., 1997). In university samples, alexithymia is significantly elevated among socially anxious (Dalbudak et al., 2013;

Knapton, Bruce & Williams, 2017; Spokas et al., 2009) or risky drinking students (Lyvers, Simons, Hayes & Thorberg, 2014) and, like social anxiety (Ham, Bonin & Hope, 2007; Mulligan, George & Brown, 2016; Stewart & Zeitlin, 1995; Thomas et al., 2003), is associated with coping motives for drinking (Lyvers et al., 2014, 2018; Lyvers, Hasking, Albrecht & Thorberg, 2012; Stewart, Zvolensky, & Eifert, 2002). Given the similar relationships of social anxiety and alexithymia with both risky drinking and coping motives for drinking in young adults at university, the issue of whether these are overlapping or independent risk factors remains uncertain. The etiology of alexithymia is unknown; a large-scale twin study suggested fairly low (30-33%) heritability for this trait (Jorgensen, Zachariae, Skytthe & Kyvik, 2007), leaving room for a developmental interpretation of alexithymia with some evidence implicating childhood neglect or inadequate parental bonding experiences (Aust, Alkan Härtwig, Heuser & Bajbouj, 2013; Evren et al., 2009; Thorberg et al., 2011b). Alexithymia has been documented in some cases as an acute reaction to severe illness, stress or trauma (Freyberger, 1977; Wise et al., 1990); however a longitudinal study of alexithymia in university students indicated stability of alexithymia despite changes in external stressors (Mikolajczak & Luminet, 2006).

Social anxiety can be differentiated into social interaction anxiety (fears of general social interaction) and social phobia (fears of social scrutiny of routine activities). Of these two forms of social anxiety, only social interaction anxiety has specifically been linked to coping motives for drinking (Clerkin & Barnett, 2012; Thomas et al., 2003). Some studies using different measures of social anxiety have yielded divergent outcomes regarding the relationship with drinking motives in undergraduate samples. For example, a study by Buckner, Schmidt and Eggleston (2006) found a significant positive association of social interaction anxiety with enhancement motives but not coping motives, although both correlations were positive, the

difference between them was small, and there was a significant positive relationship with drinking in response to unpleasant emotions. By contrast, Clerkin and Barnett found a significant negative association with enhancement motives but a positive association with coping motives, and the meta-analysis by Schry and White (2013) concluded that social anxiety was positively associated with coping, conformity and social drinking motives. Given these varying findings, all four drinking motives (coping, enhancement, conformity, social) were examined in relation to social anxiety in the present study.

As a recent investigation conducted by two of the present authors (under review) found that alexithymia mediated the link between social interaction anxiety and risky drinking in a young adult sample, the present study examined the hypothesis that social interaction anxiety in university students would, like alexithymia, be linked to coping motives for drinking –the type of drinking motive that best predicts future alcohol problems (Kuntsche et al., 2005) - and that alexithymia would mediate this relationship. The theoretical rationale for this prediction was based on a developmental interpretation of the association between alexithymia and social interaction anxiety. One possibility is that avoidance of social interaction during childhood and/or adolescence is likely to have a negative impact on emotional development and acquisition of emotional self-regulation skills, leading to an elevated risk in adulthood of depending on alcohol to cope with anxiety or other negative affect instead of using more adaptive coping strategies such as seeking social support. Alternatively, a highly alexithymic child or adolescent is likely to have deficient social skills and suffer interpersonal difficulties due to their poor ability to interpret and appropriately respond to the emotions of others (Lyvers, McCann, Coundouris, Edwards & Thorberg, 2018; Vanheule, Desmet, Meganck & Bogaerts, 2006), which could lead to the development of social interaction anxiety and promote coping-motivated

drinking for similar reasons. In either case, alexithymia would be expected to show a mediating role in the relationship between social interaction anxiety and drinking to cope. The other form of social anxiety, social phobia, was also examined in the present study in relation to drinking motives on an exploratory basis given that only social interaction anxiety has been previously linked to risky drinking and drinking to cope.

## Method

### Participants

There were 133 participants initially recruited from Griffith and Bond universities in southeast Queensland, Australia, via emailed and posted notices advertising the study and providing the link to the online questionnaire battery. Exclusion criteria were specified such that those who were not students, outside the age bracket of 18-25 years, or who did not consume alcoholic beverages were not eligible for participation. After removing 7 multivariate outliers identified via Mahalanobis distance ( $p < .001$ ), the final sample consisted of 126 students (76 females, 50 males). Consistent with previous population estimates cited earlier, 9% of the sample were identified by the established Toronto Alexithymia Scale 20 (TAS-20; Bagby, Taylor & Parker, 1994) cut-off score as highly alexithymic. The Alcohol Use Disorders Identification Test (AUDIT; Saunders et al., 1993) identified 36% of the sample as low-risk drinkers, 47% as hazardous drinkers, and 17% as harmful drinkers, reflecting the high levels of risky drinking by university students reported in previous studies (e.g., Utpala-Kumar & Deane, 2012).

### Materials

**Demographic Questionnaire.** Participant information was gathered via a series of questions assessing for exclusion criteria as well as age and gender.

**Alcohol Use Disorders Identification Test (AUDIT; Saunders et al., 1993).** The AUDIT



is a 10-item questionnaire for detecting risky or problematic drinking. Three factors are assessed: alcohol consumption (items 1 to 3; e.g., “how often do you have six or more standard drinks on one occasion?”), dependence symptoms (items 4 to 6; e.g., “how often during the last year have you needed a first drink in the morning to get yourself going after a heavy drinking session?”), and alcohol-related problems (items 7 to 10; e.g., “how often during the last year have you had a feeling of guilt or remorse after drinking?”). Questions 1 to 8 are scored on five-point Likert scales with different anchors depending on the nature of the question: (0) *never* to (4) *4 or more times a week*; (0) *1 or 2* to (4) *10 or more*; and (0) *never* to (4) *daily or almost daily*. Items 9 and 10 are scored on a three-point Likert scale: (0) *Never*, (2) *Yes, but not in the last year*, and (4) *Yes, during the last year*. To calculate a total score, responses are summed; results above 7 are considered indicative of hazardous drinking, and scores of 16 and beyond are indicative of harmful drinking. In the present study the Cronbach alpha internal consistency index for the AUDIT was acceptable ( $\alpha = .76$ ). As Gilles et al. (2006) found that social anxiety was positively associated with AUDIT problems and dependence subscales but not with consumption in university undergraduates, the present study combined the dependence and problems factors into a single index of problematic drinking, separate from the consumption factor. This index had an acceptable alpha reliability index ( $\alpha = .71$ ).

**Drinking Motives Questionnaire Revised (DMQ-R; Cooper, 1994).** The DMQ-R is comprised of 20 items answered on a six-point Likert scale, with responses indicating how often one drinks for a given reason ranging from (1) *never* to (6) *always*. The four subscales represent motives for consuming alcohol, assessed using five items per motive: enhancement motives (e.g., “because you like the feeling”), social motives (e.g., “to be sociable”), conformity motives (e.g., “to fit in with a group you like”), and coping motives (e.g., “because it helps you when you feel

depressed or nervous”). To calculate an individual’s score for each subscale, responses are averaged, thus ranging between 1 and 6. The four-factor structure of the DMQ-R was supported by university samples from six European countries (Fernandes-Jesus et al., 2016). The DMQ-R yielded high internal consistencies for each drinking motive in the present study: enhancement ( $\alpha = .85$ ), coping ( $\alpha = .86$ ), conformity ( $\alpha = .88$ ), social ( $\alpha = .90$ ).

**Toronto Alexithymia Scale 20 (TAS-20; Bagby, Parker & Taylor, 1994).** The TAS-20 assesses alexithymia via 20 items that are answered via a five-point Likert scale ranging from (1) *strongly disagree* to (5) *strongly agree*. Seven items assess difficulty identifying feelings (e.g., “I have feelings that I can’t quite identify”), five items assess difficulty describing feelings (e.g., “I find it hard to describe how I feel about people”), and eight items assess externally oriented thinking (e.g. “I can feel close to someone, even in moments of silence” – reverse scored item). Total scores can range from 20 to 100; scores over 60 are indicative of high alexithymia, whereas scores of 51 to 60 are considered borderline, and a score of 50 or below indicates low or no alexithymia (Bagby, Taylor et al., 1994). The internal consistency of the TAS-20 in the current study was acceptable ( $\alpha = .77$ ).

**Social Interaction Anxiety Scale (SIAS; Mattick & Clarke, 1998).** The SIAS assesses fears of general social interaction via 20 items (e.g., “I have difficulty making eye contact with others”) that are rated using a five-point Likert scale (0 = *not at all* to 4 = *extremely*). Responses are summed to yield a total score indicative of social interaction anxiety level. In the current sample the Cronbach’s alpha reliability index for the SIAS was high ( $\alpha = .83$ ).

**Social Phobia Scale (SPS; Mattick & Clarke, 1998).** The SPS was designed to identify circumscribed fears of scrutiny during specific routine activities and reflected the Social Phobia criteria of the DSM-III-R (American Psychiatric Association, 1987). Participants are asked to

rate how each of 20 statements (e.g., “I become anxious if I have to write in front of other people”) is characteristic of them using a five-point Likert scale (0 = *not at all* to 4 = *extremely*). Responses are summed to yield a total score indicative of social phobia level. In the current study the reliability index for the SPS was high ( $\alpha = .91$ ).

## **Procedure**

Approval was granted by the ethics committees of both universities prior to data collection. The questionnaire battery was administered online via the survey hosting website Qualtrics.com. A link directed participants first to an explanatory statement describing the study as an investigation of personality and motives for alcohol use, and stated that participation was entirely voluntary, all data provided by the respondent were anonymous, and withdrawal from the study at any time would not result in penalty. This was followed by the questionnaires presented in uniquely randomized orders; all questions had to be answered before moving to the next questionnaire. A phone contact for counselling support was provided in case a participant experienced psychological distress. The incentive for participation was either a credit point towards a psychology subject or entry into a draw to win a \$50 gift voucher. To receive their incentive, participants were prompted by the final survey page to send a screen-shot to a researcher’s email address.

## **Analyses**

Statistical analyses were conducted using IBM Statistical Package for the Social Sciences (SPSS) version 23. These included descriptive statistics, bivariate correlations, hierarchical linear regressions and mediation tests as reported below.

## **Results**

Means, standard deviations, and bivariate correlations of continuous variables are

presented in Table 1. As predicted, SIAS social interaction anxiety scores were significantly positively correlated with AUDIT problematic drinking (and not alcohol consumption), alexithymia and coping, conformity and social drinking motives as well as SPS social phobia scores. **Social phobia scores were** significantly positively correlated with alexithymia and conformity motives but not with AUDIT drinking indices. All four drinking motives (coping, enhancement, conformity, social) were significantly positively correlated with problematic drinking, whereas only enhancement and social motives were associated with alcohol consumption levels in the present young university student sample where most participants reported drinking at hazardous or harmful levels as reported earlier.

A hierarchical linear regression was conducted on coping motives for drinking. Age and gender were entered at step 1 as covariates given that age was correlated with a few other variables in the present sample (see Table 1) and given previous evidence of differential findings for males and females in the SAD-AUD link (Buckner & Turner, 2009). The model was significant at step 1,  $F(2, 123) = 4.73, p = .01$ , accounting for 7.1% of variance; as shown in Table 2, both age and gender were significant predictors such that younger age and male gender were more predictive of coping motives. At step 2, SPS social phobia and SIAS social interaction anxiety scores were entered, accounting for a significant 9.6% of additional variance,  $F_{change}(2, 121) = 6.98, p = .001$ ; the model remained significant,  $F(4, 121) = 6.08, p < .0001$ , with age, gender, and SIAS as significant predictors. TAS-20 alexithymia scores were entered at step 3, explaining a significant 13% of additional variance,  $F_{change}(1, 120) = 22.21, p < .0001$ ; the final model was significant,  $F(5, 120) = 10.16, p < .0001$ , accounting for 30% of variance in coping motives for drinking, with age, gender, SIAS, SPS and TAS-20 as significant predictors

(note that SPS was a negative predictor in the final model). Alexithymia was the strongest predictor of coping motives for drinking (see Table 2).

As social interaction anxiety - but not social phobia - was a positive predictor of coping motives, the possibility of mediation by alexithymia was examined via regression (see Baron & Kenny, 1986). After controlling for covariates of age and gender at step 1, SIAS scores significantly predicted coping motives,  $F_{change}(1, 122) = 12.45, p = .001$ , and significantly predicted the presumed mediator TAS-20,  $F_{change}(1, 122) = 31.19, p < .0001$ . In a final regression with covariates at step 1, SIAS at step 2 and TAS-20 at step 3, alexithymia accounted for an additional 10% of variance in coping motives and was significant,  $F_{change}(1, 121) = 16.50, p < .0001$ , with SIAS no longer significant; Sobel test indicated full mediation,  $z = 3.28, p = .001$  (see Figure 1).

## Discussion

As predicted, social interaction anxiety was positively related to both problematic drinking and coping motives for drinking. Social interaction anxiety was also positively related (albeit to a lesser degree) with conformity and social motives for drinking, consistent with the findings of the meta-analysis conducted by Schry and White (2013) that social anxiety is significantly positively correlated with coping, conformity and social drinking motives. Further, in the present study social interaction anxiety was a significant positive predictor of coping motives in a hierarchical regression model. Social interaction anxiety and social phobia were positively correlated with each other and with alexithymia; the latter mediated the relationship of social interaction anxiety with coping motives according to the conservative Baron and Kenny (1986) criteria for mediation via regression. The present results complement those of another

recent study by two of the present authors (under review) in which the relationship between social interaction anxiety and problematic drinking was mediated by alexithymia.

Previous research has indicated that the relationship between alexithymia and risky or problematic drinking was mediated by drinking to cope with anxiety, stress or other negative affect (Lyvers et al., 2018). In the context of reports that alexithymia is elevated both among clinical samples of clients with SAD (Cox et al., 1995; Fukunishi et al., 1997) and in clients with AUD (Cruise & Becerra, 2018; Thorberg et al., 2009), the present results would seem to suggest that alexithymia promotes coping-related drinking – an alcohol use motive known to predict future alcohol-related problems and dependence (Kuntsche et al., 2005) - among those with social interaction anxiety. Such a relationship might at least in part account for the elevated prevalence of AUD among those diagnosed with SAD (Grant et al., 2005; Schneier et al., 2010). In both clinical and nonclinical samples, alexithymia is associated not only with coping motives for drinking but also with expectancies of alcohol-induced affective change (Lyvers et al., 2014; Thorberg et al., 2016) including intensification of emotions - even negative emotions - suggesting anticipation of emotionally disinhibiting effects of alcohol. Thus a simple interpretation of alcohol use as a “tension reducer” among the socially anxious may not be entirely accurate when considering those who are also highly alexithymic. Such drinkers may come to rely on alcohol to cope not merely because drinking can make them feel less anxious or stressed, but also because alcohol as a disinhibiting substance can help them feel more in touch with their emotions and more expressive in social situations.

As discussed earlier, the heritability of alexithymia has recently been estimated at only 30-33% (Jorgensen et al., 2007), thus many instances of this trait in the population likely reflect developmental and/or environmental influences, especially among those suffering from anxiety -

including social anxiety (Evren & Evren, 2007; Freyberger, 1977; Fukunishi et al., 1997). There has been speculation that in some cases alexithymia may be an outcome of social interaction anxiety, which interferes with normal emotional development by restricting social engagement during childhood and adolescence; in adulthood the resulting deficits of emotional self-regulation may lead to reliance on pharmacological sources of mood regulation such as alcohol (Lyvers et al., 2012; Thorberg et al., 2011a, 2016) instead of seeking social support or engaging in other adaptive coping strategies. Alternatively, alexithymia may be an outcome of inadequate parental bonding experiences in childhood (Thorberg et al., 2011b) and/or childhood neglect (Aust et al., 2013; Evren et al., 2009), which would be likely to restrict acquisition of social and self-regulation skills, thereby promoting social interaction anxiety due to poor interpersonal functioning; this again would increase the risk of problematic drinking and alcohol dependence in adulthood due to a tendency to rely on alcohol to cope with anxiety or other negative affect instead of seeking social support. Of course, both processes may underlie the relationship between social interaction anxiety and alexithymia and their association with drinking to cope.

This study was limited in scope given the sample size, use of anonymous online self-report instruments, and a cross-sectional design which did not allow conclusions to be drawn concerning the nature and direction of causal relationships among variables. Larger-scale and preferably longitudinal research is required to elucidate the basis of alexithymia and its role in alcohol use among socially anxious young adults at university or in other contexts. Present results are nevertheless potentially informative as they suggest that considering social anxiety as a risk factor for problematic drinking in university students is likely to involve complexities that need to be teased out. Social interaction anxiety was positively associated with problematic drinking in the present study, whereas social phobia was not. Future research on social anxiety as

a risk factor should thus distinguish between these subtypes of social anxiety. Such research should also distinguish between alcohol consumption and alcohol-related problems (including signs of dependence) in university samples where high levels of consumption may be commonplace due to a drinking culture, and where the socially anxious may tend to avoid the social settings in which alcohol is typically consumed (Schry & White, 2013). Finally, the present study has highlighted the potential role of alexithymia as a mediating factor in relation to drinking motives and alcohol-related risk among university students (and possibly other young adults) with social interaction anxiety, suggesting that alexithymia may merit particular attention in the treatment of socially anxious clients with current or potential AUD.



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Table 1

Means (*M*), Standard Deviations (*SD*), and Intercorrelations of Variables (*N*=126)

Variable	1	2	3	4	5	6	7	8	9	<i>M</i> ( <i>SD</i> )
1. Age	-									20.58 (1.81)
2. AUDITcons	-.30***	-								5.65 (2.26)
3. AUDITprob	-.14	.52***	-							7.32 (4.30)
4. SIAS	-.04	-.08	.20*	-						29.87 (8.93)
5. SPS	.03	-.03	.12	.68***	-					13.34 (10.74)
6. TAS-20	-.03	.03	.20*	.43***	.48***	-				44.78 (10.39)
7. Enhance	-.18*	.35***	.37***	.12	-.08	.10	-			3.86 (1.12)
8. Coping	-.17	.16	.36***	.31***	.12	.36***	.52***	-		2.36 (1.02)
9. Conformity	-.16	.04	.29**	.27**	.20*	.30***	.25**	.41***	-	2.19 (.94)
10. Social	-.23**	.37***	.44***	.20*	-.01	.08	.48***	.33***	.43***	4.28 (1.10)

*Note.* AUDITcons = Alcohol Disorders Identification Test alcohol consumption; AUDITprob = AUDIT problematic drinking; SIAS = Social Interaction Anxiety Scale; SPS = Social Phobia Scale; TAS-20 = Toronto Alexithymia Scale 20; Enhance = enhancement drinking motives; Coping = coping drinking motives; Conformity = conformity drinking motives; Social = social drinking motives.

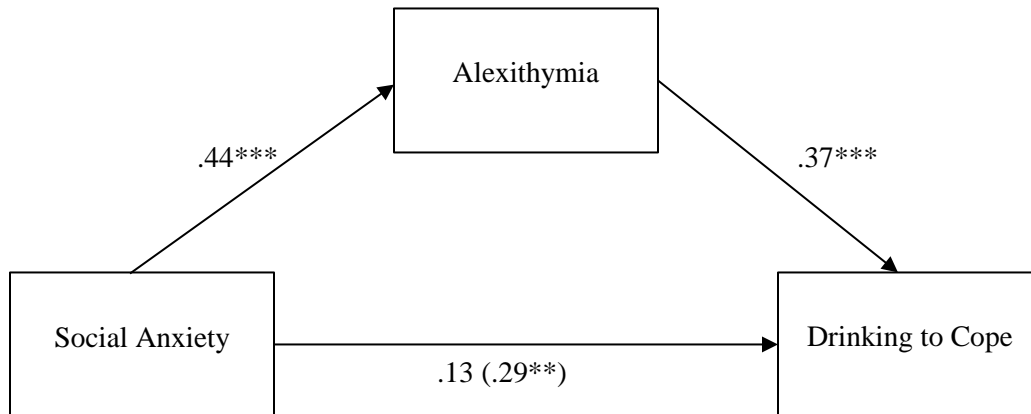
\*  $p < .05$  \*\*  $p < .01$  \*\*\*  $p < .001$

Table 2

*Hierarchical Multiple Regression Predicting Coping Motives for Drinking*

Predictor	$\Delta R^2$	$\beta$	<i>B</i>	<i>SE B</i>	95% CI for <i>B</i>
Step 1	.07*				
Age		-.20*	-.11	.05	[-.21, -.02]
Gender		.21*	.44	.18	[.08, .81]
Step 2	.10**				
Age		-.18*	-.10	.05	[-.20, -.01]
Gender		.19*	.40	.18	[.05, .75]
SIAS		.39**	.04	.01	[.02, .07]
SPS		-.14	-.01	.01	[-.03, .01]
Step 3	.13***				
Age		-.18*	-.10	.04	[-.19, -.02]
Gender		.30***	.62	.17	[.29, 1.00]
SIAS		.29**	.03	.01	[.01, .06]
SPS		-.28*	-.03	.01	[-.05, -.01]
Alexithymia		.43***	.04	.01	[.03, .06]

*Note.* SE B = standard error of unstandardized coefficient; CI = confidence interval. SIAS = Social Interaction Anxiety Scale; SPS = Social Phobia Scale. \*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$



*Figure 1.* Path coefficients for social interaction anxiety, alexithymia, and coping motives for drinking. Standardized betas for each path are shown, with the path not controlling for the mediator in parentheses. \*\*  $p < .01$  \*\*\*  $p < .001$