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Mindfulness Facets, Social Anxiety, and Drinking to Cope with Social Anxiety: Testing Mediators of Drinking Problems

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Abstract This cross-sectional study tested social anxiety symptoms, trait mindfulness, and drinking to cope with social anxiety as potential predictors and/or serial mediators of drinking problems. A community-based sample of individuals with co-occurring social anxiety symptoms and alcohol dependence were recruited. Participants ($N = 105$) completed measures of social anxiety, drinking to cope with social anxiety, and alcohol use and problems. As well, participants completed the *Five Facet Mindfulness Questionnaire*, which assesses mindfulness facets of accepting without judgment, acting with awareness, not reacting to one's internal experiences, observing and attending to experiences, and labeling and describing. As predicted, the relationship between social anxiety symptoms and drinking problems was mediated by social anxiety coping motives across each of the models. Further, the relationship between specific mindfulness facets (acting with awareness, accepting without judgment, and describe) and drinking problems was serially mediated by social anxiety symptoms and drinking to cope with social anxiety. This research builds upon existing studies that have largely been conducted with college students to evaluate potential mediators driving drinking problems. Specifically, individuals who are less able to act with awareness, accept without judgment, and describe their internal experiences may experience heightened social anxiety and drinking to cope with that anxiety, which could ultimately result in greater alcohol-related problems.

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Introduction

Research suggests that coping motives may be a critical mechanism linking social anxiety symptoms and correlates of alcohol use disorders. For example, among college students, coping motives have been shown to partially mediate the relationship between social anxiety and alcohol dependence symptoms (Ham et al. 2009). Further, research has found that drinking to reduce negative affect prospectively predicts the development of alcohol dependence among community participants (Carpenter and Hasin 1998). Supporting these findings, a review of adolescent and young adult drinking motives and outcomes found that coping motives were significantly and positively associated with drinking problems (Kuntsche et al. 2005). Taken together, drinking to cope with negative affect may be a meaningful factor in understanding the development of alcohol dependence, particularly for individuals with social anxiety symptoms.

Indeed, there is considerable empirical support for the "tension-reduction hypothesis" or "self-medication" etiological model of alcohol use disorders, by which people develop alcohol use disorders because alcohol temporarily reduces negative affect (see discussion in Sher et al. 2005). Research implicating negative affect in the development and maintenance of substance use lends merit to the self-medication model (Cheetham et al. 2010). At the same time, negative affective states, when considered in isolation, are not always strongly associated with drinking problems or consumption (Sher et al. 2005). Thus, it is necessary to consider what other factors may precipitate internally motivated drinking.

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Theoretically, there is good reason to suspect that internally motivated drinking and correlates of alcohol dependence, such as alcohol-related problems, may be negatively associated with certain facets of trait mindfulness. Whereas mindfulness involves the ability to bring one's full attention to the present moment without judgment (Kabat-Zinn 1994), addiction can be conceptualized as an inability to accept the present moment coupled with a habitual drive to achieve the temporary relief or pleasure provided by indulging in substance use (Baer 2003; Kavanagh et al. 2005; Marlatt 1994). Further, there is evidence that alcohol-related problems may be differentially related to distinct facets of trait mindfulness, including the following: (a) accepting and not judging one's experiences (*Accepting without Judgment*); (b) acting with awareness in the present moment (*Acting with Awareness*); (c) not reacting to one's internal experiences (*Nonreactivity*); (d) observing and attending to experiences (*Observe*); and (e) labeling and describing (*Describe*; Baer et al. 2006).

Testing the connection between mindfulness facets and correlates of alcohol use, Karyadi and Cyders (2015) exposed high risk, undergraduate social drinkers to pictures of alcohol to elicit alcohol cravings. Study findings indicated that accepting without judgment and acting with awareness were associated with less problematic alcohol use, and that describe was associated with lower cued alcohol cravings. The mindfulness facets of nonreactivity and observe were not significantly associated with factors related to drinking. Similarly, in a sample of college-aged students, the mindfulness facets of accepting without judgment, acting with awareness, and describing one's internal states were significantly associated with drinking correlates, whereas nonreactivity and observe were not (Fernandez et al. 2010). Finally, in a clinical sample of individuals who had recently completed an outpatient program for substance use, severity of dependence was significantly, negatively associated with accepting without judgment, acting with awareness, and describing (Bowen and Enkema 2014).

Building on this research, mindfulness-based therapeutic interventions have been successfully used for treating substance use disorders (Chiesa and Serretti 2014). One example is Mindfulness-Based Relapse Prevention (MBRP), which integrates components of cognitive behavioral relapse prevention with mindfulness practices (Bowen et al. 2014). MBRP has been associated with lower probability of heavy drinking and lower risk of relapse (Bowen et al. 2014), as well as lower rates of substance use and craving beyond 12-step-based programs and psychoeducation-based treatment as usual (Bowen et al. 2009; Witkiewitz and Bowen 2010). As another example, a 10-session mindfulness training adapted from Mindfulness-Based Cognitive Therapy was associated with decreased alcohol attention bias and physiological recovery from alcohol cues (Garland et al. 2010). In fact, a recent review found that mindfulness-based treatments were largely associated with reduced alcohol consumption (Chiesa and Serretti 2014). The success of these interventions underscores the importance of testing *why* specific trait mindfulness facets may exert a positive therapeutic effect.

One factor that might help drive the positive therapeutic effect of specific mindfulness facets is a reduction in drinking to cope with negative affect. Indeed, Reynolds, Keough, and O'Connor (2015, p. 223) noted, "the antithesis of drinking to change one's internal emotional state is to accept that state… Accepting without judgment leads to tolerance of unwanted internal experiences." In other words, individuals who are less judgmental of their internal experiences may be better able to accept thoughts, emotions, and physiological sensations as impermanent, and consequently, may be better equipped to "ride the wave" of human experience. In fact, Reynolds et al. (2015) found that undergraduate students who were less judgmental of internal states and experiences reported less motivation to drink to reduce negative affect. This study also suggested that when individuals were better able to describe and label their internal experiences (i.e., the *describe* facet of mindfulness), they reported less coping motives to drink. Relatedly, in a study examining adults who reported at least one traumatic life event and alcohol use in the previous month, lower nonjudgmental acceptance significantly predicted higher coping motives (Vujanovic et al. 2011). Finally, in a recent cross-sectional study with college students, drinking to cope was negatively related to the mindfulness facets of accepting without judgment, acting with awareness, and describing (Roos et al. 2015). Importantly, drinking to cope mediated the relationships between each of these facets and drinking problems. Similarly, recent research suggests that the relationship between heightened negative affect and greater drinking to cope may indirectly flow through problems with emotional clarity (Veilleux et al. 2014). Together, these findings suggest that lower levels of mindfulness facets—particularly the facets of accepting without judgment, acting with awareness, and describing—may contribute to individuals' drinking to cope.

Mindfulness has also been associated with social anxiety symptoms both theoretically and empirically. Acceptance-based perspectives of social anxiety hold that in social anxiety-inducing contexts (e.g., social environments), socially anxious individuals will experience negative thoughts regarding social evaluation (Herbert and Cardaciotto 2005). Subsequently, their attention toward internal experiences will increase, decreasing awareness of external cues. At this point, socially anxious individuals, who are less able to accept thoughts and experiences without judgment, will theoretically experience heightened social anxiety regarding their internal anxious state and social performance, increasing the likelihood of engaging in maladaptive coping mechanisms, such as substance abuse (Herbert and Cardaciotto 2005). In contrast, individuals who are better able to accept their internal

states without judgment will engage in less use of maladaptive coping strategies and experience reduced distress. Other facets of mindfulness may function in similar ways. For example, individuals who have difficulty acting with awareness in the present moment may become distracted by negative, self-focused attention, ultimately leading to greater social anxiety.

Supporting these theoretical links, mindfulness (measured as a unitary construct) has been negatively correlated with social anxiety symptoms among cross-sectional samples of undergraduate students (Rasmussen and Pidgeon 2011) and individuals with clinical levels of social anxiety disorder (Schmertz et al. 2012). Furthermore, Mindfulness Based Stress Reduction, which focuses on mindfulness training, or increasing flexible and nonjudgmental attention, has been shown to successfully reduce social anxiety symptoms (e.g., Goldin et al. 2009; Jazaieri et al. 2012; Kabat-Zinn 1990; Kocovski et al. 2009).

There has been very little research investigating the relationship between social anxiety symptoms and specific facets of trait mindfulness. Notwithstanding, Parsons et al. (2015) recently found that specific mindfulness facets, as measured by the Five Facet Mindfulness Questionnaire (Baer et al. 2006), were significantly correlated with measures of social anxiety symptoms and responses to a social anxiety stressor among a sample of undergraduate students. Specifically, remaining nonjudgmental and nonreactive toward internal experiences, acting with awareness in the present moment, and having the ability to label and describe one's internal experiences were negatively related to both trait and state aspects of social anxiety symptoms (see also Desrosiers et al. 2013).

Finally, there is compelling evidence that anxiety disorders, including social anxiety disorder, predate the development of alcohol use disorders (for reviews, see Buckner et al. 2013; Kushner et al. 2008; Smith and Randall 2012). Further, prior work suggests that drinking to cope with social anxiety mediates the relationship between symptoms of social anxiety and drinking problems (Buckner and Heimberg 2010), and that coping motives mediate the relationship between trait mindfulness facets and drinking problems (Roos et al. 2015). However, there is not strong empirical precedent to guide whether social anxiety symptoms predate trait mindfulness facets, or whether trait mindfulness facets predate symptoms of social anxiety.

The goal of the present study was to test social anxiety symptoms, trait mindfulness facets, and drinking to cope with social anxiety as potential predictors and mediators driving alcohol-related problems. First, we tested whether the relationship between social anxiety symptoms and drinking problems indirectly flowed through trait mindfulness facets and drinking to cope with social anxiety acting in serial (Fig. 1a). In other words, we tested whether the association between social anxiety and drinking problems flowed first through specific mindfulness facets, and then through drinking to cope with

social anxiety. We expected that greater social anxiety symptoms would predict a diminished ability to accept without judgment, which in turn was expected to predict greater coping motives to drink. Ultimately, less acceptance without judgment and greater drinking to cope, acting in serial, were hypothesized to result in greater drinking problems. We expected a similar pattern of relationships for the acting with awareness and describe facets. Second, we tested whether the relationship between trait mindfulness facets and drinking problems indirectly flowed through social anxiety symptoms and drinking to cope with social anxiety acting in serial (Fig. 1b). Similar to the previous model, we predicted that greater nonjudgmental acceptance would predict less social anxiety symptoms, which in turn would predict less drinking to cope, and less drinking problems. We expected a similar pattern of relationships for the acting with awareness and describe facets.

Method

Participants

This study was a secondary data analysis of participants drawn from a broader attention bias modification intervention trial (Clerkin et al. 2016). See Table 1 for detailed sample characteristics. Individuals were eligible to participate in the trial if during an initial phone screen they (1) were ≥18 years old; (2) met diagnostic criteria for current alcohol dependence as assessed by the Mini-International Neuropsychiatric Interview (MINI; Sheehan et al. 1998); (3) reported elevated social anxiety symptoms (i.e., scores of ≥30 on the experimenter-administered *Liebowitz Social Anxiety* Scale; Mennin et al. 2002); (4) reported willingness to decrease their drinking; and (5) spoke English and indicated that they could read. Participants were excluded from participation if during an initial phone screen they (1) screened positive for current psychotic or manic symptoms; (2) demonstrated significant cognitive impairment; (3) reported drug use other than nicotine or marijuana within the past month; (4) were currently receiving cognitive-behavioral therapy for social anxiety or an alcohol use disorder; and (5) had been taking a psychotropic medication for less than 6 weeks. At the time of written informed consent, participants' Breath Alcohol Content (BrAC) needed to be <.02.

The current study used data from the baseline assessment of the trial, which was collected prior to the intervention. To ensure current drinking problems, participants were excluded from analyses if they reported that they had consumed alcohol during the preceding month either "never" or "less than once per month" (*n* = 6). To ensure current social anxiety symptoms, participants were also excluded from analyses in the present study if at baseline, they scored more than 2 SD below

Fig. 1 **a** Hypothesized serial multiple mediation model with social anxiety as the predictor variable. **b** Hypothesized serial multiple mediation model with trait mindfulness as predictor variable
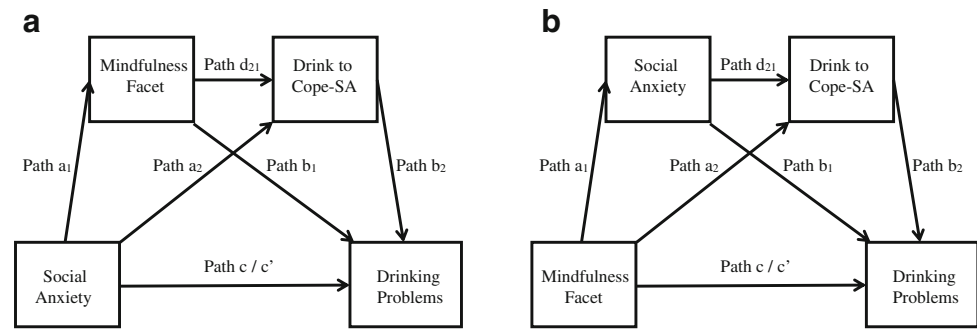
the mean of a sample diagnosed with social phobia on the LSAS (Heimberg et al. 1999; LSAS *range* in current study is 24–133), or if they did not report any symptoms of social anxiety on either of the other two trait measures of social anxiety (*n* = 4). This resulted in a final sample of 105 participants.

Procedure

A community-based sample of individuals with co-occurring social anxiety symptoms and alcohol dependence were recruited. Only measures relevant to the current study are included here. See Clerkin et al. (2016) for more information.

Measures

The *Mini-International Neuropsychiatric Interview* English Version 5.0 for DSM-IV (MINI; Sheehan et al. 1998) was used to evaluate inclusion and exclusion criteria. Participants in the present study all screened positive for alcohol dependence on the MINI, which assesses symptoms of alcohol dependence during the preceding 12 months.

The *Drinker Inventory of Consequences* measure (DrInC; Miller et al. 1995) assesses drinking problems in five domains during the previous month: physical, intrapersonal, social responsibility, interpersonal, and impulse control. In the present study, we evaluated how often participants experienced drinking problems in the past month (on a four-point scale from "never" to "daily or almost daily"). The DrInC has been found to be a reliable and valid assessment of drinking problems (Forcehimes et al. 2007). Participants were also asked to indicate whether they had "ever" experienced each problem. Those who indicated "No" for these items received a score of "0" for the past month items. In the current sample, the measure demonstrated excellent reliability (α = .96).

The calendar-based *Daily Drinking Questionnaire* (Collins et al. 1985) was used to evaluate weekly alcohol consumption. To minimize error, participants were provided with a definition of a standard drink (e.g., 12

ounces, or one can or bottle of beer; 5 ounce glass of wine, etc.), and a calendar was used to help orient participants to the previous week. Then, participants were asked to report verbally how much alcohol (measured in number of standard drinks) they drank each day during the previous week, as well as during an "average" day during the previous month. The research assistant recorded each daily standard drink number reported by the participant, checking for each answer that the participant was reporting standard drinks and converting the number to standard drink units if necessary. Consumption (i.e., total drinks per week) was analyzed in the current study.

Our key measures of social anxiety symptoms were as follows: (1) the experimenter-rated *Liebowitz Social Anxiety Scale* (LSAS; Liebowitz 1987; α = .96); (2) the self-reported 17-item *Social Interaction Anxiety Scale* (SIAS; Mattick and Clarke 1998; Rodebaugh et al. 2007; α = .93); and (3) the self-reported 20-item *Social Phobia Scale* (SPS; Mattick and Clarke 1998; α = .94). The three measures of social anxiety were significantly inter-correlated (*N* = 105; *r* range .67–.79). The LSAS and SIAS-17 were transformed to be on the same scale as the SPS (i.e., each LSAS score was multiplied by a constant of 5/9, and each SIAS-17 score was multiplied by a constant of 20/17, resulting in a total score of 80 for all three measures). Then an average of the measures was taken to compute our key measure of social anxiety symptoms, referred to as Social Anxiety Composite.

Mindfulness facets were measured using the *Five Facet Mindfulness Questionnaire* (FFMQ; Baer et al. 2006). This measure uses a five-point scale to assess five facets of mindfulness: (a) Accepting without Judgment, or accepting one's experiences without judgment (e.g., "I tell myself I shouldn't be feeling the way I'm feeling"—reverse scored); (b) Acting with Awareness, or giving one's full attention to the present moment while redirecting one's attention from distractions (e.g., "I find it difficult to stay focused on what's happening in the present moment"—reverse scored); (c) Nonreactivity, or not reacting to one's internal experiences (e.g., "I perceive

Table 1 Descriptive statistics and sample characteristics

Sample characteristics	
	Raw M (SD) range or % N = 105
Age (years)	43.14 (11.59)
Sex	
Male	57.1 %
Female	42.9 %
Education	
Some high school or less	7.6 %
High school graduate	32.4 %
Some college	31.4 %
Associates/bachelors degree	23.8 %
Masters degree	2.9 %
Doctorate/professional degree	1.9 %
Race	
American Indian/Alaska Native	1.9 %
Asian	1.0 %
Black/African American	51.4 %
White	39.0 %
Multiracial	5.7 %
Other	1.0 %
Social anxiety symptoms	
Social Anxiety Composite	35.95 (14.24)
Liebowitz Social Anxiety Scale	73.42 (25.48)
Social Interaction Anxiety Scale—17 item	31.34 (14.09)
Social Phobia Scale	30.20 (16.35)
Alcohol-related measures	
Drinker Inventory of Consequences	41.47 (26.59)
Daily Drinking Questionnaire	30.13 (25.44)
Alcohol Withdrawal Symptom Checklist	16.40 (10.14)
Social anxiety coping motives	
Drink to Cope with Social Anxiety (DTC-SA)	5.96 (2.08)
Depression symptoms	
Center for Epidemiologic Studies Depression Scale	28.09 (11.09)
	Raw M (SD) N = 77
Mindfulness facets	
Accepting without judgment	24.44 (6.08)
Acting with awareness	25.65 (6.94)
Nonreactivity	19.79 (4.19)
Observe	26.43 (5.92)
Describe	25.82 (6.08)

Raw values of the Daily Drinking Questionnaire are included in the table for descriptive purposes. All questionnaire measures reflect scores reported during the baseline assessment

my feelings and emotions without having to react to them"); (d) Observe, or observing and attending to experiences (e.g., "When I'm walking, I deliberately notice the sensations of my body moving"); and (e) Describe, or labeling and describing (e.g., "I'm good at finding words to describe my feelings"). Reliability for each facet was good to excellent in the current sample (Accepting without Judgment: $\alpha = .84$; Acting with Awareness: $\alpha = .89$; Nonreactivity: $\alpha = .70$; Observe: $\alpha = .77$; Describe: $\alpha = .84$).

An adaptation of the *Drink to Cope* (referred to here as "drinking to cope with social anxiety" or DTC-SA; Thomas et al. 2003) was used to assess participants' use of alcohol as a means of coping with their social anxiety. The following items were used to create a composite DTC-SA score: (1) What percentage of the time would you use alcohol to feel more comfortable or less anxious in social situations where alcohol is available? (0 to 100 %; recoded 0 to 10); (2) What percentage of the time do you drink before engaging in a social situation (0 to 100 %; recoded 0 to 10); (3) What percentage of the time do you drink after engaging in a social situation (0 to 100 %; recoded 0 to 10); and (4) How much does alcohol relieve your anxiety or discomfort in social situations (0, "not at all", to 10, "completely"). Participants were also asked to indicate whether they ever drank during, before, or after social situations. Those who indicated "No" for these items received a score of "0" on items 1–3 of the DTC-SA, respectively. The reliability of the DTC-SA in the current sample was good ($\alpha = .73$).

The Center for Epidemiologic Studies Depression Scale (CES-D; Radloff 1977), which assesses symptoms of depression, and the Alcohol Withdrawal Symptom Checklist (AWSC; Pittman et al. 2007), which assesses the severity of a variety of alcohol symptoms within the last 24 h, were included to better characterize the sample. Reliability for these measures was good to excellent in the current sample (CES-D: $\alpha = .89$; AWSC: $\alpha = .88$).

Data Analyses

Serial mediation models were tested following contemporary guidelines for conducting mediation analyses, which emphasize testing hypothesized indirect effects, as opposed to individual pathways (Hayes 2013). See Fig. 1a and b. For each set of models, each mindfulness facet was tested in a separate model, but models were otherwise identical. Drinking Consumption was initially considered as a covariate in primary mediation models, but was dropped because the pattern of findings for key indirect effects was the same whether consumption was included or not (a minor deviation from this pattern is noted in Table 3B).

Individual pathways and indirect effects were evaluated using Mplus version 7 (Muthén and Muthén 1998–2015). Ten thousand bootstrap samples were used in each test of the indirect effect. Each model contained bias-corrected bootstrap confidence intervals for three specific indirect

effects: (1) Paths a_1 ➜ b_1; (2) Paths a_2 ➜ b_2; (3) Paths a_1 ➜ d_{21} ➜ b_2 (the serial mediation indirect effect; see Fig. 1a, b). Statistical significance was determined by 95 % bias-corrected bootstrap unstandardized confidence intervals that did not overlap with zero. Finally, the ratio of the indirect effect to the total effect (P_M) was reported as an effect size measure.

Results

See Table 1 for descriptive statistics and sample characteristics. A square root transformation was conducted on Drinking Consumption. This helped to maximize the normality of the distribution, minimize the influence of potential outliers, and minimize violations of OLS regression assumptions.

Of the 105 participants, 28 (26.7 %) did not receive the FFMQ because this measure was added to the study protocol after data collection was underway. There were no significant group differences between individuals who were administered the FFMQ (vs. not) on any variables included in the serial mediation model (Social Anxiety Composite, DTC-SA, or Drinking Problems; all $p > .10$), on drinking Consumption and alcohol withdrawal symptoms (both $p > .10$), or on most demographic variables (Age, Sex, Race, Ethnicity, Marital Status; all $p > .05$). There was a significant group difference between those who received the FFMQ (vs. not) on Educational Status (assessed with a Linear-by-Linear Association = 4.71, $p = .03$), as well as on depressive symptoms (CESD; $p = .05$). When compared to those who were not administered the FFMQ, those administered the FFMQ had lower CESD scores and higher levels of education.

Listwise deletion of missing data has been found to bias results and reduce statistical power (Jelicic et al. 2009; Widaman 2006). Further, according to Graham (2009, pp. 559–560), multiple imputation and maximum likelihood methods are "always at least as good as the old procedures (e.g., listwise deletion, except in artificial, unrealistic circumstances), and MI/ML methods are typically better than old methods, and often very much better." This is true even when the missing at random assumption has been violated, and with significant amounts of missing data (Graham 2009; Graham and Schafer 1999). Thus, following modern recommendations to handle missing data, missing data in the first set of mediation models, with social anxiety as the predictor, were addressed using full information maximum likelihood (FIML) estimation. Because full information maximum likelihood cannot be used to estimate missing values on the predictor variable, the sample size for analyses when the mindfulness facet was the predictor was 77.

Social Anxiety as Predictor

As reflected in Tables 2, across each model, neither of the hypothesized mediation pathways involving the mindfulness facets were significant (social anxiety symptoms ➜ mindfulness facet ➜ drinking problems; social anxiety symptoms ➜ mindfulness facet ➜ drinking to cope ➜ drinking problems). However, consistent with prior research, across each model, individuals with greater social anxiety symptoms were more likely to drink to cope with social anxiety (pathway a_2), and individuals who were more likely to drink to cope with social anxiety were more likely to experience greater drinking problems (pathway b_2). Critically, there was a significant indirect effect of social anxiety symptoms on drinking problems via coping motives for each model, indicating that drinking to cope with social anxiety functioned as a mediator of the relationship between social anxiety symptoms and drinking problems.

Pointing to the robustness of these findings, the pattern for the specific indirect effects was the same across all five models when just evaluating participants who had received the FFMQ ($N = 77$), as well as when consumption was included as a covariate. Further, when all mindfulness facets were included in a single model, there was still a significant indirect effect of social anxiety symptoms on drinking problems via coping motives ($Estimate = .22$, $SE = .10$, 95 % CI [.08, .49], $P_M = .33$), but none of the other specific indirect effects were significant.

Mindfulness Facets as Predictors

As depicted in Table 3, as expected, there were significant indirect effects of accepting without judgment on drinking problems via social anxiety symptoms *and* via social anxiety symptoms and drinking to cope with social anxiety acting in serial. Similarly, as expected, there were significant indirect effects of acting with awareness on drinking problems via social anxiety symptoms *and* via social anxiety symptoms and drinking to cope with social anxiety acting in serial. Finally, as expected, there were significant indirect effects of describe on drinking problems via social anxiety symptoms *and* via social anxiety symptoms and drinking to cope with social anxiety acting in serial. The total effect between both of the other mindfulness facets (Nonreactivity, Observe) and drinking problems were nonsignificant ($ps > .10$). Further, there were no significant indirect effects in the Nonreactivity or Observe models.

Pointing to the robustness of the key indirect effect findings, when all of the mindfulness facets were included simultaneously in a single model, the pattern was very similar. Over and above the other facets of mindfulness, there were still significant indirect effects of acting with awareness on drinking problems via social anxiety symptoms ($Estimate = -.33$,

Table 2 Social anxiety as predictor: unstandardized regression coefficients, standard errors, standardized regression coefficients, and indirect effects

A. Social anxiety ➔ Accepting without judgment ➔ Drinking to cope ➔ Drinking problems model

		M₁ (Accepting without judgment)					M₂ (DTC-SA)					Y (Drinking problems)			
		b	SE	p	β		b	SE	p	β		b	SE	p	β
X (Social anxiety)	a_1	−.19	.04	<.01	−.44	a_2	.07	.01	<.01	.49	c'	.35	.18	.06	.19
M₁ (Accepting without judgment)		–	–	–	–	d_{21}	.02	.04	.71	.04	b_1	−.38	.43	.38	−.09
M₂ (DTC-SA)		–	–	–	–		–	–	–	–	b_2	3.73	1.23	<.01	.29

Total effect (c)
   $b = .67$, $SE = .17$, $p < .001$, β = .36
Specific indirect effects
   1. Social anxiety symptoms ➔ Accepting without judgment ➔ Drinking problems
     Estimate = .07, *SE* = .08, 95 % CI (−.08, .25), P_M = .10
   2. Social anxiety symptoms ➔ Drinking to cope with social anxiety ➔ Drinking problems
     Estimate = .27, *SE* = .10, 95 % CI (.11, .49), P_M = .40
   3. Social anxiety symptoms ➔ Accepting without judgment ➔ Drinking to cope with social anxiety ➔ Drinking problems
     Estimate = −.01, *SE* = .03, 95 % CI (−.07, .05), P_M = −.01

B. Social anxiety ➔ Acting with awareness ➔ Drinking to cope ➔ Drinking problems model

		M₁ (Acting with awareness)					M₂ (DTC-SA)					Y (Drinking problems)			
		b	SE	p	β		b	SE	p	β		b	SE	p	β
X (Social anxiety)	a_1	−.26	.04	<.01	−.54	a_2	.06	.02	<.01	.40	c'	.33	.20	.09	.18
M₁ (Acting with awareness)		–	–	–	–	d_{21}	−.04	.04	.33	−.12	b_1	−.38	.45	.40	−.10
M₂ (DTC-SA)		–	–	–	–		–	–	–	–	b_2	3.54	1.25	<.01	.28

Total effect (c)
   $b = .67$, $SE = .17$, $p < .001$, β = .36
Specific indirect effects
   1. Social anxiety symptoms ➔ Acting with awareness ➔ Drinking problems
     Estimate = .10, *SE* = .12, 95 % CI (−.14, .34), P_M = .15
   2. Social anxiety symptoms ➔ Drinking to cope with social anxiety ➔ Drinking problems
     Estimate = .21, *SE* = .09, 95 % CI (.07, .45), P_M = .31
   3. Social anxiety symptoms ➔ Acting with awareness ➔ Drinking to cope with social anxiety ➔ Drinking problems
     Estimate = .04, *SE* = .04, 95 % CI (−.02, .14), P_M = .05

C. Social anxiety ➔ Nonreactivity ➔ Drinking to cope ➔ Drinking problems model

		M₁ (NonReact)					M₂ (DTC-SA)					Y (Drinking problems)			
		b	SE	p	β		b	SE	p	β		b	SE	p	β
X (Social anxiety)	a_1	.02	.04	.62	.06	a_2	.07	.01	<.01	.47	c'	.44	.17	.01	.24
M₁ (NonReact)		–	–	–	–	d_{21}	-.02	.05	.65	-.05	b_1	−.79	.66	.23	−.13
M₂ (DTC-SA)		–	–	–	–		–	–	–	–	b_2	3.58	1.25	<.01	.28

Total effect (c)
   $b = .67$, $SE = .17$, $p < .001$, β = .36
Specific indirect effects
   1. Social anxiety symptoms ➔ Nonreactivity ➔ Drinking problems
     Estimate = −.01, *SE* = .04, 95 % CI (−.14, .03), P_M = -.02
   2. Social anxiety symptoms ➔ Drinking to cope with social anxiety ➔ Drinking problems
     Estimate = .25, *SE* = .09, 95 % CI (.09, .46), P_M = .37
   3. Social anxiety symptoms ➔ Nonreactivity ➔ Drinking to cope with social anxiety ➔ Drinking problems
     Estimate = −.001, *SE* = .008, 95 % CI (−.03, .007), P_M = −.001

D. Social anxiety ➔ Observe ➔ Drinking to cope ➔ Drinking problems model

		M₁ (Observe)					M₂ (DTC-SA)					Y (Drinking problems)			
		b	SE	p	β		b	SE	p	β		b	SE	p	β
X (Social anxiety)	a_1	.06	.05	.22	.14	a_2	.07	.01	<.01	.47	c'	.45	.17	<.01	.24
M₁ (Observe)		–	–	–	–	d_{21}	−.003	.03	.93	−.009	b_1	−.51	.42	.22	−.11
M₂ (DTC-SA)		–	–	–	–		–	–	–	–	b_2	3.66	1.25	<.01	.29

Total effect (c)
   $b = .67$, $SE = .17$, $p < .001$, β = .36
Specific indirect effects
   1. Social anxiety symptoms ➔ Observe ➔ Drinking problems
     Estimate = −.03, *SE* = .04, 95 % CI (−.15, .01), P_M = −.04
   2. Social anxiety symptoms ➔ Drinking to cope with social anxiety ➔ Drinking problems
     Estimate = .25, *SE* = .09, 95 % CI (.10, .47), P_M = .37
   3. Social anxiety symptoms ➔ Observe ➔ Drinking to cope with social anxiety ➔ Drinking problems
     Estimate = −.001, *SE* = .009, 95 % CI (−.02, .03), P_M = −.001

Table 2 (continued)

E. Social anxiety ➔ Describe ➔ Drinking to cope ➔ Drinking problems model

		M_1 (Describe)					M_2 (Drinking to cope)					Y (Drinking problems)			
		b	SE	p	β		b	SE	p	β		b	SE	p	β
X (Social anxiety)	a_1	−.13	.05	<.01	−.31	a_2	.07	.01	<.01	.45	c'	.34	.18	.07	.18
M_1 (Describe)		–	–	–	–	d_{21}	−.02	.04	.61	−.05	b_1	−.68	.52	.19	−.15
M_2 (Drinking to cope)		–	–	–	–		–	–	–	–	b_2	3.56	1.26	<.01	.28

Total effect (c)
  $b = .67$, $SE = .17$, $p < .001$, $β = .36$
Specific indirect effects
  1. Social anxiety symptoms ➔ Describe ➔ Drinking problems
    Estimate = .09, *SE* = .09, 95 % CI (−.02, .32), $P_M = .13$
  2. Social anxiety symptoms ➔ Drinking to cope with social anxiety ➔ Drinking problems
    Estimate = .24, *SE* = .10, 95 % CI (.08, .47), $P_M = .35$
  3. Social anxiety symptoms ➔ Describe ➔ Drinking to cope with social anxiety➔ Drinking problems
    Estimate = .008, *SE* = .02, 95 % CI (−.02, .07), $P_M = .01$

$SE = .22$, 95 % CI [−.93, −.02], $P_M = .47$) and via social anxiety symptoms and drinking to cope with social anxiety acting in serial (*Estimate* = −.12, *SE* = .09, 95 % CI [−.45, −.02], $P_M = .18$). Similarly, there were still significant indirect effects of describe on drinking problems via social anxiety symptoms (*Estimate* = −.24, *SE* = .17, 95 % CI [−.71, −.003], $P_M = .33$) and via social anxiety symptoms and drinking to cope with social anxiety acting in serial (*Estimate* = −.09, *SE* = .07, 95 % CI [−.31, −.007], $P_M = .12$), over and above the other facets of mindfulness. Further, there was still a significant indirect effect of accepting without judgment on drinking problems via social anxiety symptoms and drinking to cope with social anxiety acting in serial (*Estimate* = −.08, *SE* = .07, 95 % CI [−.33, −.001], $P_M = .11$), when controlling for the other facets of mindfulness. The specific indirect effect of accepting without judgment on drinking problems via social anxiety (*Estimate* = −.22, *SE* = .19, 95 % CI [−.78, .01], 90 % CI [−.69, −.01], $P_M = .29$) trended toward but did not reach statistical significance, when controlling for the other facets of mindfulness.

Discussion

Prior research has separately tested most of the specific links evaluated here. However, to our knowledge, this study provided the first test of each of these links operating together. The current findings advance prior work conducted largely with college students by suggesting that even in a sample with diagnosed alcohol dependence, individuals with greater social anxiety may experience greater drinking problems in part because they drink to cope with their social anxiety. Further, by testing a series of models that varied which variable was the predictor versus mediator, findings highlight the ways in which specific trait mindfulness facets and social

anxiety symptoms may work together to drive alcohol use disorders.

Given that there was not strong empirical precedent to guide whether social anxiety symptoms predate trait mindfulness facets, or whether trait mindfulness facets predate symptoms of social anxiety, we tested two competing sets of models: one set in which social anxiety was the predictor, and another set in which the trait mindfulness facets were the predictor. Results suggested that low trait mindfulness may be the initial risk factor that leads to elevated social anxiety symptoms, followed by enhanced drinking to cope with social anxiety, and subsequent drinking problems. More specifically, findings expanded upon prior work in which accepting without judgment, acting with awareness, and describe were each associated with correlates of drinking (Bowen and Enkema 2014; Fernandez et al. 2010; Karyadi and Cyders 2015; Reynolds et al. 2015) and social anxiety symptoms (Parsons et al. 2015), and work suggesting that drinking to cope mediated the relationship between these trait mindfulness facets and drinking problems (Roos et al. 2015). In particular, we found that there was a significant indirect effect between each of these trait mindfulness facets (accepting without judgment, acting with awareness, and describe) and drinking problems via social anxiety symptoms and drinking to cope with social anxiety acting in serial.

In the context of the current study, it may be that individuals with greater ability to accept without judgment, act with awareness, and describe were better able to engage in the types of self-monitoring that allow one to make more adaptive choices in "hot" situations (see similar discussion in Reynolds et al. 2015). For instance, according to Wiers et al. (2010), there is often a conflict between one's "cold," or rational attitudes and beliefs about health risk behaviors (e.g., "it is stupid to drink 10 drinks in a night"), and one's actual behavioral impulses in "hot," or "tempting," situations (e.g., "drinking will be my 'social lubricant' and help me get through this

Table 3 Mindfulness facet as predictor: unstandardized regression coefficients, standard errors, standardized regression coefficients, and indirect effects

A. Accepting without judgment ➔ Social anxiety ➔ Drinking to cope ➔ Drinking problems model

		M₁ (Social anxiety)					M₂ (DTC-SA)					Y (Drinking problems)			
		b	SE	p	β		b	SE	p	β		b	SE	p	β
X (Accepting without judgment)	a_1	−1.07	.23	<.01	-.45	a_2	.02	.04	.68	.05	c'	−.35	.40	.39	−.08
M₁ (Social anxiety)		–	–	–	–	d_{21}	.06	.02	<.01	.43	b_1	.53	.19	<.01	.29
M₂ (DTC-SA)		–	–	–	–		–	–	–	–	b_2	3.34	1.44	.02	.26

Total effect (c)

$b = -1.08$, $SE = .40$, $p = .007$, $\beta = -.25$

Specific indirect effects

1. Accepting without judgment ➔ Social anxiety symptoms ➔ Drinking problems
   Estimate = −.57, *SE* = .22, 95 % CI (−1.07, −.21), $P_M = .52$

2. Accepting without judgment ➔ Drinking to cope with social anxiety ➔ Drinking problems
   Estimate = .05, *SE* = .15, 95 % CI (−.21, .43), $P_M = -.05$

3. Accepting without judgment ➔ Social anxiety symptoms ➔ Drinking to cope with social anxiety➔ Drinking problems
   Estimate = −.22, *SE* = .11, 95 % CI (−.52, −.05), $P_M = .20$

B. Acting with awareness ➔ Social anxiety ➔ Drinking to cope ➔ Drinking problems model

		M₁ (Social anxiety)					M₂ (DTC-SA)					Y (Drinking problems)			
		b	SE	p	β		b	SE	p	β		b	SE	p	β
X (Acting with awareness)	a_1	−1.15	.20	<.01	−.55	a_2	−.04	.04	.33	−.13	c'	−.35	.43	.41	−.09
M₁ (Social anxiety)		–	–	–	–	d_{21}	.05	.02	<.01	.34	b_1	.51	.20	.01	.28
M₂ (DTC-SA)		–	–	–	–		–	–	–	–	b_2	3.17	1.46	.03	.25

Total effect (c)

$b = -1.23$, $SE = .38$, $p = .001$, $\beta = -.32$

Specific indirect effects

1. Acting with awareness ➔ Social anxiety symptoms ➔ Drinking problems
   Estimate −.59, *SE* = .25, 95 % CI (−1.13, −.17), $P_M = .47$

2. Acting with awareness ➔ Drinking to cope with social anxiety ➔ Drinking problems
   Estimate = −.12, *SE* = .15, 95 % CI (−.53, .08), $P_M = .10$

3. Acting with awareness ➔ Social anxiety symptoms ➔ Drinking to cope with social anxiety➔ Drinking problems
   Estimate = −.18, *SE* = .12, 95 % CI (−.53, −.03), $P_M = .14$

C. Describe ➔ Social Anxiety ➔ Drinking to Cope ➔ Drinking Problems Model

		M₁ (Social anxiety)					M₂ (DTC-SA)					Y (Drinking problems)			
		b	SE	p	β		b	SE	p	β		b	SE	p	β
X (Describe)	a_1	−.78	.30	<.01	−.33	a_2	−.02	.04	.63	−.05	c'	−.63	.49	.20	−.14
M₁ (Social anxiety)		–	–	–	–	d_{21}	.06	.02	<.01	.40	b_1	.52	.19	<.01	.28
M₂ (DTC-SA)		–	–	–	–		–	–	–	–	b_2	3.20	1.46	.03	.25

Total effect (c)

$b = -1.22$, $SE = .56$, $p = .03$, $\beta = -.28$

Specific indirect effects

1. Describe ➔ Social anxiety symptoms ➔ Drinking problems
   Estimate −.40, *SE* = .19, 95 % CI (−.89, −.12), $P_M = .33$

2. Describe ➔ Drinking to cope with social anxiety ➔ Drinking problems
   Estimate = −.05, *SE* = .12, 95 % CI (−.36, .15), $P_M = .04$

3. Describe ➔ Social anxiety symptoms ➔ Drinking to cope with social anxiety➔ Drinking problems
   Estimate = −.14, *SE* = .09, 95 % CI (−.44, −.02), $P_M = .11$

In Table 3B, the pattern of findings for the specific indirect effects was the same when consumption was included as a covariate. However, for the third indirect effect (Acting with awareness ➔ Social anxiety symptoms ➔ Drinking to cope with social anxiety ➔ Drinking problems), the 95 % bias-corrected confidence interval crossed zero (*Estimate* = −.10, *SE* = .08, 95 % CI [−.37, .001], 90 % CI [−.31, −.01], $P_M = .10$)

night"). If someone is able to act with awareness, or label and accept their internal experiences without judgment, they may be able to mindfully act and choose different responses other than drinking to manage their social anxiety (e.g., leave the party, engage in slow breathing). Consequently, they might be able to halt more automatic, spontaneous impulses to more fully consider the situation, and potentially limit the types of drinking known to lead to greater problems (e.g., drinking to cope with social anxiety).

Consistent with prior research (e.g., Buckner and Heimberg 2010; Ham et al. 2009) and existing, cognitive-behavioral approaches (McCrady 2008), findings from this study support the traditional focus of CBT on enhancing coping abilities to manage negative affect. Indeed, the finding that social anxiety coping motives mediated the relationship between social anxiety symptoms and drinking problems was robust across multiple models and follow-up tests. The findings also suggest that rather than trying to directly restructure or change negative cognitions and affect, another viable intervention strategy might be working to enhance clients' specific mindfulness skills, which in turn might lead to less social anxiety and less drinking problems. More specifically, based on our findings, interventions focused on strengthening the mindfulness skills of accepting without judgment, acting with awareness, and describe could lead to less social anxiety, fewer coping motives to drink, and ultimately, fewer problems related to drinking.

It is interesting that although the specific goal of acceptance-based therapies is *not* to directly reduce anxiety, a by-product of developing these mindfulness capacities is that an individual may be able to act in ways that result in less anxiety, as well as less harmful behaviors that are driven by anxiety. On the one hand, these findings may promote "buy in" from the many clients whose explicit goal in therapy is a reduction in negative affect, and who may be resistant to the idea of learning to identify, tolerate, and accept the full range of human emotions without trying to modify the content. On the other hand, findings from this study suggest that for the individual who is already experiencing heightened social anxiety, mindfulness may not be enough to break the link between social anxiety and harmful behaviors like drinking to cope. In particular, contrary to expectations, there were no indirect effects of social anxiety on drinking problems via any of the mindfulness facets tested here. This lack of significant indirect effects may be partially related to our sample. Specifically, individuals in the present study reported experiencing heightened social anxiety symptoms *and* they screened positive for alcohol dependence. Thus, the total effect between social anxiety and drinking problems was especially strong, leaving less room for potential mediators.

Results from this study must be interpreted in light of several limitations. First, the design of this study was cross-sectional, so the question of whether social anxiety precedes deficits in trait mindfulness, or vice versa, cannot be disentangled with these data. Future research using a longitudinal design will be critical to address this meaningful question. Notwithstanding, according to Hayes (2013), one of the leading experts on contemporary approaches to mediation, it is reasonable to conduct mediation analysis even if one cannot firmly establish causality due to limitations of one's design (e.g., correlational data collected at one time point). Thus, while bearing in mind the necessary caveats to interpret these findings, the solid theoretical rationale provides a firm foundation upon which the present tests of mediation were based. Another limitation is that we only evaluated one type of drinking motive—drinking to cope with social anxiety. Future research will need to evaluate other potential mediators, particularly other drinking motivations (Cooper 1994). Third, while this study advances prior research by using a sample with co-occurring symptoms of social anxiety and alcohol dependence, future research may want to consider other comorbidities as well. For instance, we cannot rule out that these effects are specific to social anxiety, as opposed to due to aspects of social anxiety that overlap with related problems like depression. Fourth, findings will need to be replicated with more participants, as a limitation of this research was our use of a relatively small sample size for tests of mediation (Fritz and MacKinnon 2007). That said, while roughly 27 % of the sample were missing data on the mindfulness measure, our use of full information maximum likelihood was a strength of this study as it helped us to preserve statistical power and the structure of the data set (Graham 2009).

In spite of these limitations, the present study contributes novel findings that highlight the ways in which specific trait mindfulness facets and social anxiety symptoms may work together to drive drinking problems. Moreover, this research builds upon existing studies that have largely been conducted with college students by evaluating mediators of drinking problems in a community-based sample with alcohol dependence. It is also worth highlighting that unlike most other work conducted in this area, roughly half of our sample identified as Black or African American. This is meaningful given that there is a pressing need to include more individuals who identify as racial minorities in psychological research (Sue 1999). Most notably, this research suggests that individuals who have a reduced capacity to accept without judgment, act with awareness, and describe their internal experiences may be at heightened risk for drinking problems. Further, this relationship may be fueled by greater levels of social anxiety and drinking to cope with that anxiety.

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