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Motives and Consequences of Alcohol Use in People With Social Anxiety Disorder: A Daily Diary Study

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People with social anxiety disorder (SAD) are at increased risk for alcohol-related problems. Most research exploring social anxiety and alcohol use has examined negative drinking consequences, with less consideration of positive consequences—namely positive social experiences—that may reinforce alcohol use. In this daily diary study, we examined how adults diagnosed with SAD ($N = 26$) and a psychologically healthy control group ($N = 28$) experienced positive drinking consequences in naturally occurring drinking episodes during the study period. For 14 consecutive days, participants answered questions about alcohol use, motives for drinking, and positive consequences of drinking. On days when participants drank, those with SAD were more likely than healthy controls to perceive a reduction in anxiety, but the two groups did not differ in their likelihood of experiencing positive social drinking consequences. For both groups, on days when they were more motivated to drink to enhance social experiences (*affiliation motives*) or cope with distress (*coping motives*), they were more likely to obtain positive consequences from drinking. Compared to controls, participants with SAD endorsed stronger trait and daily coping motives (anxiety-coping, social anxiety-coping, and depression-coping). Results are discussed in the context of reinforcement mechanisms that may maintain social anxiety and alcohol use.

Keywords: social anxiety; alcohol use; drinking motives; daily diary

SOCIAL ANXIETY is associated with alcohol-related problems (Morris et al., 2005). People with social anxiety disorder (SAD) are two to three times more likely to develop an alcohol use disorder (AUD) than the general population (Kushner et al., 2000). Among those diagnosed with comorbid SAD and AUD, SAD precedes the onset of AUD approximately 79% of the time (Schneier et al., 2010), suggesting SAD prospectively increases risk for alcohol-related problems. Given this temporal ordering, links between social anxiety and alcohol use are often explained with classic theories that suggest alcohol, an anxiolytic, is consumed to reduce distress, which in turn negatively reinforces alcohol use (e.g., tension-reduction; Conger, 1956).

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While distress-reduction frameworks offer a useful starting point, they may overlook unique features of SAD (see Bacon & Ham, 2010; Buckner et al., 2013). In particular, people with SAD might also be motivated to consume alcohol to facilitate positive social experiences (i.e., *affiliation motives*)[1] that they desire but often lack. Affiliation-motivated drinking might facilitate desirable social experiences (e.g., strengthening or forming a social relationship). To date, however, most studies of alcohol use and anxiety have measured negative drinking consequences without consideration of positive consequences. This gap is noteworthy given that positive drinking consequences may occur more frequently than negative ones, increase the perceived importance of obtaining positive consequences in future drinking, and lead to problematic drinking (Lee et al., 2011; Patrick & Maggs, 2008; Villarosa-Hurlocker et al., 2018). To address this gap, we used daily diary methodology to examine how adults with SAD and a psychologically healthy control group experienced positive social and nonsocial drinking consequences and how drinking motives predicted the likelihood of these consequences.

NEGATIVE REINFORCEMENT FRAMEWORK

Distress-reduction frameworks suggest that people with SAD are (a) motivated to consume alcohol to cope with anxiety (i.e., *coping motives*) and (b) report reductions in anxiety when drinking (Buckner et al., 2021; Carrigan & Randall, 2003). Indeed, people with elevated social anxiety endorse elevated coping motives (Terlecki & Buckner, 2015), including to cope specifically with social anxiety (Buckner & Heimberg, 2010; Cludius et al., 2013). In addition to trait questionnaire and laboratory research, one ecological momentary assessment (EMA) study found that when participants felt lonely or socially anxious, those with SAD craved alcohol more than those without SAD (Kim & Kwon, 2020). In a diary study, participants high in social anxiety drank more after embarrassing events than those lower in social anxiety (O'Grady et al., 2011), suggesting elevated coping motives. As for perceived anxiety reduction, experimental research has found that consuming alcohol leads to reductions in self-reported and physiological indicators of anxiety in people with elevated social anxiety (Stevens et al., 2014, 2017) and SAD (Abrams et al., 2001). Nonetheless, laboratory findings on alcohol's anxiolytic effect and social anxiety have been inconsistent (Battista et al., 2010). As an alternative, experience-sampling methods (ESM) minimize recall bias and maximize ecological validity (Tennen et al., 2000). ESM studies suggest that alcohol is associated with reduced anxiety (Armeli et al., 2003; Battista et al., 2015; Swendsen et al., 2000), and people higher in anxiety perceive greater reductions in distress after drinking than those lower in anxiety (Gorka et al., 2017). In sum, coping-motivated drinking and perceived distress reduction negatively reinforce alcohol use in people with SAD.

POSITIVE REINFORCEMENT FRAMEWORK

Alcohol use might also be maintained by positive reinforcement via affiliation motives and social rewards. People with SAD desire strong, intimate relationships to the same degree as those without SAD (Goodman et al., 2019) and often enjoy socializing (Goodman et al., 2021). However, people with SAD also tend to have worse quality relationships and less desirable social skills than less anxious peers (see Alden & Taylor, 2010). Thus, people with SAD may view alcohol as a way to facilitate positive social interactions they lack but desire. In a meta-analysis of college student samples, social anxiety symptoms were positively correlated with affiliation motives (Schry & White, 2013). People with social anxiety may also expect alcohol to facilitate positive social experiences and desirable social behaviors (Booth & Hasking, 2009; Gilles et al., 2006; Ham et al., 2016). Expectations about positive outcomes may be specific to social situations; one study found that adults high in social anxiety expected alcohol to facilitate positive social outcomes but not nonsocial positive outcomes (Ham et al., 2005).

Nonetheless, even if people with SAD are *motivated* to obtain positive social outcomes, whether they occur following alcohol use is an empirical question. A small body of social anxiety research suggests that alcohol use may facilitate social benefits. In a survey study, college students high in social anxiety reported more positive drinking consequences in the prior month than those low in social anxiety (Villarosa-Hurlocker et al., 2018). In one of the few ESM studies on social anxiety and alcohol use, Goodman et al. (2018) found that the more socially anxious participants felt during social interactions, the worse they rated the quality of their interaction—but only when sober. When participants consumed alcohol, social anxiety was *unrelated* to interaction quality, sug-

[1] In Cooper's (1994) model, affiliation motives are referred to as "social motives." However, conformity motives—one of the four drinking motives identified—inherently involve social interactions. For greater precision, we use the term "affiliation motives" (e.g., Cullum et al., 2012).

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gesting that alcohol may disrupt social consequences of social anxiety. An experimental study found that confederates rated socially anxious participants who drank as friendlier and more desirable than those who did not drink (Battista et al., 2012). Thus, consuming alcohol might facilitate positive social experiences for people with SAD.

EXAMINING DRINKING MOTIVES AND CONSEQUENCES IN TANDEM

Motivational models of alcohol suggest different drinking motives predict different drinking consequences, and the strength of these relationships maintains alcohol use over time (Lee et al., 2018; Merrill & Read, 2010). For example, coping motives are commonly associated with negative drinking consequences (e.g., dependence; Merrill et al., 2014); if someone is motivated to drink to cope and experiences distress reduction from drinking, then they may be likely to drink in future situations when distressed. Affiliation motives are often associated with positive social drinking consequences (e.g., Capron & Schmidt, 2012); if someone is motivated to drink to connect with others and often experiences positive social experiences when drinking, then they may be likely to drink in situations in which they want to connect with others.

ESM is well-suited to examine motives–consequences relationships. Estimates from ESM studies suggest that approximately *half* of the variability in drinking motives occurs within-person (Armeli et al., 2014; O'Hara et al., 2015), with estimates as high as 60% for affiliation motives (Stevenson et al., 2019). Moreover, aggregate measures of drinking motives may predict drinking consequences differently than momentary measures. In one EMA study, between-person coping motives (i.e., aggregate, trait-like measure) were associated with negative drinking consequences, but within-person daily coping motives (i.e., momentary, state-like measure) were not (Stevenson et al., 2019; see also Cook et al., 2020; Dvorak et al., 2014). Taken together, motives vary within and between persons, and obtainment of drinking-related consequences depends on endorsement of different motives—making daily diary an appropriate methodology.

THE PRESENT STUDY

This study had three aims. Aim 1 was to determine if participants with SAD differed from controls in affiliation and coping motives. Consistent with trait questionnaire research (Schry & White, 2013), we hypothesized that participants with SAD would endorse higher affiliation and coping motives than controls. To our knowledge, no study has examined how social anxiety predicts state (e.g., daily) drinking motives (see Votaw & Witkiewitz, 2021, for a review on daily drinking motives). Aim 2 was to determine if participants with SAD differed from controls in their likelihood of experiencing positive drinking consequences. We measured three social experiences (increased sociability, strengthening and/or forming a relationship, pleasurable sexual experience) typically impaired in social anxiety (Alden & Taylor, 2010; Bodinger et al., 2002; Naragon-Gainey et al., 2009) and common expectations of alcohol use (Fromme et al., 1993). Our study builds off a small number of studies by examining positive social experiences that occur as a result of alcohol use (rather than general social interaction quality; e.g., Goodman et al., 2018), leveraging ESM to assess experiences the morning after they occur (rather than global questionnaires; e.g., Villarosa-Hurlocker et al., 2017, 2018), and using a clinical community sample of adults diagnosed with SAD (rather than undiagnosed undergraduates; e.g., Battista et al., 2012). We hypothesized that participants with SAD would more frequently report positive social drinking consequences than controls. In addition, we also assessed perceived anxiety reduction, a positive consequence central to distress-reduction models. Consistent with experimental (Stevens et al., 2017) and ESM research (Armeli et al., 2003; Battista et al., 2015; Swendsen et al., 2000), we hypothesized that participants with SAD would more frequently report anxiety reduction than controls. Aim 3 was to determine how affiliation and coping motives predicted positive drinking consequences. Consistent with distress-reduction research (e.g., Treloar et al., 2015), we hypothesized that coping motives would be positively associated with anxiety reduction. Although research has predominantly assessed negative drinking consequences, a small body of work has examined how trait measures of drinking motives predict positive consequences (e.g., Capron & Schmidt, 2012; Piasecki et al., 2014). We hypothesized that affiliation motives would predict increased likelihood of positive social drinking consequences. We did not specify hypotheses for affiliation motives predicting anxiety reduction or coping motives predicting positive social consequences. To our knowledge, no study has examined daily relationships between drinking motives and positive consequences.

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Method

PARTICIPANTS AND PROCEDURE

Participants were recruited from a large northeastern U.S. city and surrounding suburbs using flyers, social media, and online platforms. Two types of advertisements were used: one targeted to social anxiety (e.g., "Anxious in social settings?"), and one advertised a generic "smartphone study." Participants completed a phone screen with postbaccalaureate research assistants; participants provided verbal consent, answered questions about inclusion criteria (18 years or older, proficiency in English, personal mobile phone with continuous Internet access), and completed a semistructured interview. Participants with social anxiety fears suggestive of SAD or no symptoms of mental illness ($N = 111$) completed a baseline laboratory session. Clinical psychology doctoral students administered the Structured Clinical Interview for DSM-5 disorders (SCID-5-CV) to assess for anxiety, mood, substance, trauma- and stressor-related, obsessive-compulsive-related, and psychotic disorders. Eligibility for the SAD group was a primary SAD diagnosis; comorbid diagnoses were allowed (see Table 1). Eligibility for the control group was the absence of a current or past mental disorder. Psychotic disorder diagnosis was an exclusion criterion for both groups. We did not specify alcohol use behaviors as inclusion criteria and aimed to maximize sample representativeness by not restricting it to those who regularly consume alcohol. Based on the SCID-5-CV, 45 people qualified for the SAD group and 49 qualified for the control group. Seventeen participants were excluded because they did not meet eligible diagnostic criteria (i.e., primary diagnosis that was not SAD); of these excluded participants, 14 met criteria for major depressive disorder (MDD), 3 for substance use disorder (SUD), 3 for generalized anxiety disorder (GAD), 2 for psychosis, 1 for obsessive-compulsive disorder (OCD), and 1 for posttraumatic stress disorder (PTSD) (sum > 17 due to comorbidity). Seven eligible participants declined to continue for various reasons (e.g., comfort, interest). Thus, 87 participants (SAD: 42; controls: 45) completed the daily surveys. Research assistants trained participants on survey completion via *ESmCapture*, a mobile data collection platform, and reviewed a detailed handout with survey instructions, items, and FAQs.

Participants received surveys for 14 consecutive days beginning the day after their baseline session. A 2-week surveying period balances the need to obtain enough reports per participant to characterize typical experiences with the need to minimize participant burden (see Eisele et al., 2020). Surveys were sent via text messages that contained individualized links. Participants received two types of surveys each day: morning surveys were sent each morning at 9:00 a.m. and included questions about the previous day, and EMA surveys were sent five times randomly from 12:00–8:00 p.m. and included questions about current mood. Our research questions concerned constructs measured in the morning reports; therefore, only data from morning reports were included in this paper. Participants could earn $75: $40 for the baseline and $35 for the daily surveys ($0.50/morning survey; $0.25/EMA survey; $5 and $5.50 compliance bonuses for answering 80% or more surveys each week, respectively). Baseline survey data were lost due to a technical error for one participant in the SAD group and they were excluded from analyses. Only those who consumed alcohol during the study were included in the final sample (26 participants with SAD, 28 controls). See Table 1 for demographic information and diagnostic comorbidities. Our original sample size ($N = 87$) was based on recommendations from multilevel power simulations (Nezlek, 2012). Given that this paper included a subset of our original sample (participants who drank), we inspected post-recruitment power in our final sample. We used the *EMAtools* package examine power curves, which suggests we were powered to detect medium-sized effects at Level 1 (within-person). To examine Level 2 power (between-person), we examined power estimates for linear mixed models using the *sjstats* package, which suggests we were powered to detect large between-person effects.[2]

MEASURES

Trait Drinking Motives[3]

To determine if daily drinking motives participants reported during the 2-week sampling period were

[2] Power estimation in multilevel modeling is a complex issue with little consensus. Some researchers provide rough sample size estimates (e.g., Nezlek [2012] and Maas and Hox [2005] both recommended 50 participants for daily diary studies), but caution that providing firm recommendations is challenging because power in multilevel models varies as a function of numerous parameters, including the number of participants, number of diary entries, size of the fixed effects, and reliability of coefficients of interest (Nezlek, 2012). A priori estimates require assumptions about multiple parameters, most of which are unknown.

[3] We focused on two drinking motives (affiliation, coping) tied to frameworks of interest. Nonetheless, for comprehensiveness, we included baseline and daily measures of all four drinking motives in Cooper's (1994) model. For transparency, we conducted analyses with conformity and enhancement motives and reported them in supplemental materials (Tables S1 and S2).

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Table 1
Demographic and Descriptive Information

Variable	SAD	Healthy Controls	Full Sample
Participant Demographics	**N (%)**	**N (%)**	**N (%)**
Gender			
Woman	18 (69.2)	15 (53.6)	33 (61.1)
Man	8 (30.8)	13 (46.4)	21 (38.9)
Race/Ethnicity			
White/Caucasian	16 (61.5)	12 (42.9)	28 (51.9)
Asian/Pacific Islander	4 (15.4)	3 (10.7)	7 (13.0)
Black/African American	3 (11.5)	6 (21.4)	9 (16.7)
Latino/Hispanic	2 (7.7)	3 (10.7)	5 (9.3)
Arab/Middle Eastern	0 (0.0)	1 (3.6)	1 (1.9)
Other	1 (3.8)	3 (10.7)	4 (7.4)
Age	$M = 29.3$ ($SD = 8.32$)	$M = 32.5$ ($SD = 10.91$)	$M = 30.94$ ($SD = 9.79$)
Comorbidity			
Major Depressive Disorder	7 (26.9%)	–	–
Alcohol Use Disorder	5 (19.2%)	–	–
Generalized Anxiety Disorder	6 (23.1%)	–	–
PTSD	4 (15.4%)	–	–
Panic Disorder	2 (7.7%)	–	–
Agoraphobia	1 (3.8%)	–	–
Persistent Depressive Disorder	1 (3.8%)	–	–
Substance Abuse Disorder	1 (3.8%)	–	–
OCD	1 (3.8%)	–	–
Descriptives of Drinking Days[a]	**%**	**%**	**%**
Social (vs. solitary) Drinking	72.0	79.86	24.0
Social Drinking Environment			
Friends	41.09	43.97	53.48
Family	13.16	14.13	13.67
Romantic Partner	38.18	41.14	39.72
Coworker	7.58	6.33	6.90
Stranger	13.69	7.57	10.50
Other	4.83	7.90	6.43
Type of Social Gathering			
Date	13.71	20.24	17.11
Party	17.72	9.83	13.61
Work Meeting/Event	8.45	8.00	8.22
Simple Conversations	26.45	19.07	22.61
Gathering with Friends	23.50	28.62	26.17
Other	10.17	14.24	12.29

Note. SAD = social anxiety disorder. PTSD = posttraumatic stress disorder. OCD = obsessive compulsive disorder.
[a] Values represent average percentages within each group (i.e., SAD, controls, or full sample), calculated by number of reported instances divided by total number of reported instances for each variable.

indicative of their general drinking motives, participants completed a measure of trait motives: the 20-item Drinking Motives Questionnaire-Revised (DMQ-R; Cooper, 1994). Affiliation motives assess drinking for social rewards and/or to improve social interactions (e.g., "Because it helps you enjoy a party"); coping motives assess drinking to escape/buffer negative emotions (e.g., "To cheer up when you are in a bad mood"); conformity motives assess drinking to fit in and/or avoid rejection (e.g., "So that others won't kid you about not drinking"); enhancement motives assess drinking to maintain or enrich positive feelings (e.g., "Because it gives you a pleasant feeling"). Items were rated on a 5-point Likert scale from 1 = *almost never/never* to 5 = *almost always/always* and averaged for each subscale. The DMQ-R demonstrates good internal consistency (Cooper, 1994), test-retest reliability (Grant et al., 2007), convergent validity (e.g., Piasecki et al., 2014). Reliability in the present sample was acceptable (αs: affiliation = .93, coping = .83, conformity = .89, enhancement = .90).

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Daily Self-Report Questionnaires

Participants were asked if they consumed alcohol at any time during the prior day. If they said *yes*, they answered questions about their drinking (items described below). Reliability for multi-item daily measures was computed with *psych::mlr*, which creates indices of within-person (R_{cn}) and between-person (R_kR_n) variations averaged over items.

Drinking Motives. Drinking motives were assessed using an adapted version of the DMQ-R. Items were modified for daily use and began with "I drank yesterday because…" Items were rated on a 5-point Likert scale from 1 = *not at all* to 5 = *extremely* and averaged for each motive. Two items measured affiliation motives: "Because it makes a social gathering more fun" and "To be more sociable" (R_{cn} = .86; R_kR_n = .86). Three items measured conformity motives: "So others wouldn't judge me for not drinking," "To fit in with others," and "To be liked" (R_{cn} = .62; R_kR_n = .95). Two items measured enhancement motives: "Because it's fun" and "Because I like the feeling" (R_{cn} = .58; R_kR_n = .93). Coping motives were assessed separately with three single-item measures (a common approach in ESM research e.g., Dvorak et al., 2014): anxiety coping ("To feel less anxious"), social anxiety coping ("To feel less concerned about what others think of me"), and depression coping ("To feel less depressed"). Factor analytic work of the DMQ-R suggest that depression coping and anxiety coping motives are distinct (Grant et al., 2007) and predict unique patterns of alcohol use (Collins et al., 2018; Grant et al., 2009; Wycoff et al., 2021). Anxiety coping can be further distinguished from social anxiety coping; each offers unique predictive validity in drinking outcomes (Collins et al., 2021; Cooper et al., 2014).[4]

Positive Drinking Consequences. Positive consequences were drawn from trait questionnaires of positive expectations of drinking (Brown et al., 1987; Buckner & Matthews, 2012; Fromme et al., 1993) and daily drinking consequences (Lee et al., 2017). Items were adapted to be face valid, past tense, and reference a discrete event (consistent with measures of negative drinking consequences e.g., Feinn et al., 2003). Participants were asked: "Did any of the following occur as a result of your drinking episode?" and completed a checklist of four positive drinking consequences: "I was more sociable than I typically am," "I strengthened an existing relationship and/or formed a new relationship," "I had an enjoyable sexual experience," and "I felt less anxious than before I started drinking." They responded *yes* or *no* to each event. Given that these positive consequences are discrete events that are not related in meaningful ways, we analyzed each consequence separately rather than combining them into one total score.

Drinking Quantity and Context. We collected contextual information on each drinking day and report this as descriptive information (Table 1). Quantity consumed was measured with the item "How many standard drinks did you consume?" with an open-ended response option; participants received a visual guide that quantified one standard drink as a 375 mL mid-strength beer (3.5% alc/vol), a 100mL serving of wine (12% alc/vol), or a 30 mL shot of spirits (40% alc/vol). To assess social drinking, participants were asked, "At any point, did you drink with other people?" (*yes* or *no*). If *yes*, they were asked about social partners ("Who were you with?" *friends*, *family*, *coworkers*, *romantic partner*, *stranger*, *other*), gathering type ("What type of social gathering was this event?" *date*, *party*, *work event*, *simple conversation*, *gathering of friends*, and *other*), number of people present ("Approximately how many people were at the event?" [free response]), and number of people with whom they interacted ("Approximately how many people did you talk to (individually or within a group) at the event?" [free response]).

Results

ANALYTIC OVERVIEW

Analyses were conducted in *R* (R Core Team, 2020). To accommodate the hierarchical data structure (days nested within persons), multilevel modeling was used for within-person hypotheses using *lme4*. Linear multilevel modeling was used for continuous outcomes; generalized linear multilevel modeling was used for dichotomous outcomes. Level 1 continuous variables were group-mean centered; Level 2 continuous variables were grand-mean centered and standardized; and dichotomous variables were uncentered (Nezlek, 2012). Linear modeling was used to compare means of Level 2 dependent variables using *stats*. Effect sizes were estimated with Cohen's d (1992). Two multilevel effect sizes were computed: marginal R^2_m (proportion of total variance in

[4] We computed the reliability of a total score of the three coping motives items to determine if they might be best combined into a single measure. Though the between-person reliability was acceptable (R_kR_n = .96), the within-person reliability was low and well below acceptable thresholds (R_{cn} = .26), further supporting our decision to analyze them as separate items.

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Table 2
Descriptive Statistics and Within- and Between-Person Correlation Coefficients for Daily Drinking Motives

Variable	1	2	3	4
1. Affiliation motives	–	.21	.29*	.50***
2. Depression coping motives	–.07	–	.65***	.54***
3. Anxiety coping motives	.27***	.16*	–	.82***
4. Social anxiety coping motives	.26***	–.03	.52***	–
5. *M (SD)*	2.22 (1.16)	1.26 (.53)	1.67 (.96)	1.43 (.91)
6. *ICC*	.30	.27	.50	.48

Note. Upper triangle represents between-person correlations and lower triangle represents within-person correlations. ICC = Intraclass correlation.
** $p < .01$.
* $p < .05$.
*** $p < .001$

dependent variable explained by fixed effects) and conditional R^2_c (proportion of total variance explained by fixed and random effects; Nakagawa et al., 2017).

DESCRIPTIVE STATISTICS

Compliance was high. Across the study period, participants completed 85.58% of possible morning reports. Participants completed reports on an average of 12 of 14 study days ($M = 11.98$; $SD = 2.74$). The minimum number of surveys completed was 4; and only three participants completed fewer than 7 surveys (i.e., half of total possible surveys). Given that there are no established norms for compliance cutoffs, every participant completed multiple surveys during the sampling period, and linear mixed effects models are robust to missing data, especially at Level 1 (Kamarck et al., 2011), we did not specify an arbitrary compliance exclusion criterion and retained all participants. Bivariate correlations and intraclass correlation coefficients (ICC) were calculated for daily drinking motives; ICCs range from .27–.50, suggesting most of the variance is attributable to within-person changes (see Table 2).

Participants reported 1–14 drinking days with an average of 4 drinking days over the 2-week period ($M = 4.20$; $SD = 3.22$). Participants reported consuming between 1 and 12 drinks per drinking day with an average of 3 drinks per drinking day ($M = 3.13$; $SD = 2.22$). Participants with and without SAD did not differ in their average number of drinking days (SAD: $M = 4.73$; $SD = 3.62$; Controls: $M = 3.71$; $SD = 2.77$; $b = 1.02$, 95% CI [–.74, 2.77], $t = 1.16$, $p = .25$; $d = .32$) or average drinks consumed per drinking day (SAD: $M = 3.46$; $SD = 2.16$; Controls: $M = 2.89$; $SD = 2.28$; $b = .66$, 95% CI [–.57, 1.90], $t = 1.08$, $p = .29$; $d = .30$).

Trait affiliation motives were positively associated with daily affiliation motives ($\beta = .42$, 95% CI [.19, .66], $t = 3.50$, $p < .001$, $R^2_m/R^2_c = .09/.31$). Trait coping motives were positively associated with daily anxiety coping ($\beta = .44$, 95% CI [.23, .66], $t = 3.99$, $p < .001$, $R^2_m/R^2_c = .17/.57$) and social anxiety coping motives ($\beta = .32$, 95% CI [.11, .53], $t = 3.01$, $p < .01$, $R^2_m/R^2_c = .11/.54$); trait coping motives were unrelated to daily depressing coping motives ($\beta = .10$, 95% CI [.00, .20], $t = 1.90$, $p = .05$, $R^2_m/R^2_c = .03/.28$). Thus, participants' drinking motives on days when they consumed alcohol during the study were similar to their general drinking motives.[5]

AIM 1: DRINKING MOTIVES

Participants with and without SAD did not differ in trait affiliation motives (SAD: $M = 3.45$; $SD = 1.21$; Controls: $M = 2.83$; $SD = 1.14$; $b = .62$, 95% CI [–.02, 1.26], $t = 1.93$, $p = .06$; $d = .53$) or daily affiliation motives (SAD: $M = 2.26$; $SD = 1.55$; Controls: $M = 2.83$; $SD = 1.14$; $b = .22$, 95% CI [–.24, .69], $t = .95$, $p = .34$).

Relative to controls, participants with SAD reported stronger trait coping motives (SAD: $M = 2.49$; $SD = .85$; Controls: $M = 1.46$; $SD = .58$; $b = 1.04$, 95% CI [.64, 1.43], $t = 5.27$, $p < .001$; $d = 1.44$) and stronger daily depression

[5] The same was true for conformity and enhancement motives. Trait conformity motives were positively associated with daily conformity motives ($\beta = 0.36$, 95% CI [0.25, 0.48], $t = 6.01$, $p < .001$, $R^2_m/R^2_c = .31/.59$). Trait enhancement motives were positively associated with daily enhancement motives ($\beta = 0.48$, 95% CI [0.28, 0.69], $t = 4.69$, $p < .001$, $R^2_m/R^2_c = .20/.47$).

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coping (SAD: $M = 1.45$; $SD = .63$; Controls: $M = 1.05$; $SD = .26$; $b = .39$, 95% CI [.22, .56], $t = 4.50$, $p < .001$, $R^2_m/R^2_c = .14/.28$), anxiety coping (SAD: $M = 2.11$; $SD = 1.07$; Controls: $M = 1.16$; $SD = .44$; $b = 1.08$, 95% CI [.72, 1.43], $t = 5.91$, $p < .001$, $R^2_m/R^2_c = .28/.55$), and social anxiety coping motives (SAD: $M = 1.71$; $SD = 1.11$; Controls: $M = 1.11$; $SD = .42$; $b = .72$, 95% CI [.34, 1.10], $t = 3.69$, $p < .001$, $R^2_m/R^2_c = .14/.53$).

AIM 2: POSITIVE DRINKING CONSEQUENCES

Participants with and without SAD did not differ in likelihood of positive social drinking consequences. Participants with SAD reported increased sociability on 45.5% of drinking days (56 of 123 days) compared to 30.7% (32 of 104 days) for controls ($OR = 3.37$, 95% CI [.95, 11.96], $z = 1.88$, $p = .05$); relationship development on 41.4% of drinking days (51 of 123 days) compared to 39.4% (41 of 104 days) for controls ($OR = 1.58$, 95% CI [.61, 4.12], $z = .94$, $p = .34$); and an enjoyable sexual experience on 7.3% of drinking days (9 of 123 days) compared to 12.5% (13 of 104 days) for controls ($OR = .54$, 95% CI [.21, 1.41], $z = -1.25$, $p = .21$).

Participants with SAD were much more likely than controls to report a perceived reduction in anxiety when they drank ($OR = 14.17$, 95% CI [3.09, 64.90], $z = 3.42$, $p < .001$, $R^2_m/R^2_c = .21/.60$). Participants with SAD reported reductions in anxiety on 59.3% of drinking days (73 of 123 days) compared to 25.0% (26 of 104 days) for controls.

AIM 3: DRINKING MOTIVES PREDICTING POSITIVE DRINKING CONSEQUENCES

On days when participants drank, the stronger their affiliation motives, the more likely they were to report increased sociability, strengthening and/or forming new relationships, and perceiving anxiety reduction. Affiliation motives were unrelated to the likelihood of having an enjoyable sexual experience. Model statistics are reported in Table 3.

On days when participants drank, the stronger their anxiety coping motives, the more likely they were to strengthen and/or form new relationships and perceive a reduction in anxiety. Anxiety coping motives were unrelated to increased sociability and enjoyable sexual experiences. On days when participants drank, the stronger their social anxiety coping motives, the more likely they were to report increased sociability and anxiety reduction. Social anxiety coping motives were unrelated to relationship development and enjoyable sexual experiences. Depression coping motives were unrelated to all measured consequences. See Table 3.[6]

Discussion

Distress-reduction models suggest that people with anxiety disorders consume alcohol to reduce anxiety, which negatively reinforces alcohol use. However, emerging research suggests that people with SAD may also experience social rewards that *positively* reinforce alcohol use (Goodman et al., 2018; Villarosa-Hurlocker et al., 2018). We used daily diary methods to examine coping and affiliation motives and rewards from naturally occurring drinking episodes.

POSITIVE DRINKING CONSEQUENCES

Participants with and without SAD did not differ in likelihood of experiencing positive social drinking consequences (increased sociability, relationship development/formation, enjoyable sexual experience). Thus, despite research suggesting that people with elevated social anxiety often expect alcohol to facilitate positive social outcomes (e.g., Eggleston et al., 2004), we did not find support for more frequent obtainment of these outcomes. Importantly, alcohol expectancies are distinct from actual perceived effects from alcohol, and the latter might be more influential in reinforcing drinking patterns (Higgins et al., 2004). Nonetheless, we caution against overinterpreting null effects, and in the spirit of spurring future research, propose two avenues to explore social drinking experiences in people with SAD. First, research could explore if/how alcohol reduces prototypical safety behaviors that interfere with social interactions (e.g., limiting speech), which in turn might facilitate positive experiences (Battista et al., 2012). Dyadic daily diary designs, for example, could gather informant reports from interaction partners (e.g., romantic partner) to assess if/

[6] An empirical question is whether coping and affiliation drinking motives predict positive drinking consequences differently for people with and without SAD. Research on drinking motives and *negative* consequences offers some evidence of potential differences based on social anxiety symptoms, though findings are mixed. Studies have found that coping motives predict more alcohol related-problems for people high in social anxiety compared to those low in social anxiety (Ham et al., 2005; Terlecki et al., 2017); other studies have found moderation in the opposite direction, where coping motives more strongly predict negative drinking consequences for people *low* in social anxiety (Clerkin & Barnett, 2012); and others have found no support for moderation (Buckner et al., 2006; see also Eggleston et al., 2004). To our knowledge, no study has examined how social anxiety moderates drinking motives and positive drinking consequences. Therefore, as an exploratory aim, we examined if the motives–consequences relationships differed between participants with and without SAD. Findings are reported in Supplemental Table S3.

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Table 3
Main Effects for Drinking Motives Predicting Positive Drinking Consequences

	Increased Sociability			Relationship Development			Enjoyable Sexual Experiences			Anxiety Reduction		
Predictor	OR	95% CI	z	OR	95% CI	z	OR	95% CI	z	OR	95% CI	z
Affiliation motives	6.38	[3.21, 12.68]	5.28***	3.96	[2.37, 6.61]	5.25***	1.08	[0.64, 1.80]	0.28	2.96	[1.73, 5.04]	3.98***
Depression coping motives	0.52	[0.22, 1.19]	−1.54	0.68	[0.32, 1.44]	−1.01	1.01	[0.33, 3.10]	0.01	0.81	[0.37, 1.78]	−0.52
Anxiety coping motives	1.19	[0.72, 1.99]	0.68	1.92	[1.15, 3.20]	2.50*	0.71	[0.33, 1.51]	−0.90	2.29	[1.23, 4.25]	2.62**
Social anxiety coping motives	1.9	[1.05, 3.42]	2.13*	1.65	[0.97, 2.78]	1.86	0.81	[0.36, 1.80]	−0.51	1.87	[1.01, 3.46]	1.98*
N people	53			54			54			54		
N days	226			227			226			227		

Note. OR = Odds ratio. CI = 95% Confidence intervals. *z* = *Z*-values.
* $p < .05$.
** $p < .01$.
*** $p < .001$

how behavior differs across drinking versus sober situations. Second, research could explore if/how people with SAD evaluate social interactions differently when intoxicated (e.g., increased focus on positive aspects of the interaction: Hagen et al., 2020). For example, research can assess positively and negatively valenced thoughts immediately after social interactions to explore differences between situations with and without alcohol.

Consistent with hypotheses, participants with SAD reported perceived anxiety reduction more frequently (60% of drinking days) than controls (25% of drinking days). These findings are consistent with experimental and EMA research demonstrating that people with social anxiety report anxiety reductions after drinking (Abrams et al., 2001; Battista et al., 2015; Stevens et al., 2017). Future research can explore mechanisms of this relationship, such as if/how alcohol diverts attention away from threatening stimuli and decreases attention to cues that signal uncertain or uncontrollable threats (Bradford et al., 2017, 2022).

Taken together, results on drinking consequences are consistent with negative reinforcement theories that suggest alcohol use among people with SAD is reinforced by anxiety reduction (Buckner et al., 2021). In contrast, we did not find support for outcomes of a positive reinforcement framework, in which people with SAD would experience more social benefits than controls. These findings are noteworthy given that different reinforcement patterns are linked to different outcomes. In one study of 2,556 adults, anticipated receipt of tension reduction and relaxation (outcomes associated with negative reinforcement) was associated with alcohol-related problems, whereas anticipated receipt of social and physical pleasure (outcomes associated with positive reinforcement) was associated with more frequent alcohol consumption (Cho et al., 2019). Given that social anxiety is often unrelated to (e.g., O'Grady et al., 2011; Terlecki et al., 2014)—or negatively associated with (e.g., Eggleston et al., 2004)—levels of alcohol consumption (despite high rates of alcohol-related problems), negative reinforcement models continue to hold promise in explaining social drinking patterns in social anxiety.

DRINKING MOTIVES

Contrary to hypotheses, participants with and without SAD endorsed similar levels of trait and daily affiliation motives. This finding is inconsistent with meta-analytical work linking social anxiety symptoms with higher affiliation motives (Schry & White, 2013). One possibility is that

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people with SAD endorse elevated affiliation motives in certain situations. For example, people with SAD may experience stronger affiliation motives when they perceive a high chance of success (e.g., lunch with friends) compared to threatening situations (e.g., first date). Conversely, social safety could attenuate affiliation motives, as one may feel confident socializing without intoxication. Our finding is also inconsistent with research suggesting that people high in social anxiety expect drinking to facilitate positive social experiences (Booth & Hasking, 2009; Gilles et al., 2006; Ham et al., 2016). Nonetheless, drinking expectancies and motives are distinct; expectancies are beliefs about consequences of drinking, whereas motives reflect the importance placed on effects of drinking. Beliefs that alcohol will facilitate desirable social outcomes does not imply one will also hold strong social motives (Kuntsche et al., 2010).

Consistent with hypotheses, participants with SAD endorsed higher levels of trait coping motives and daily depression coping, anxiety coping, and social anxiety coping motives than controls. These findings replicate and extend research with trait questionnaires showing that social anxiety is associated with elevated coping motives (Schry & White, 2013) and are consistent with distress-reduction frameworks. They also suggest that people with SAD drink to cope with different forms of distress (i.e., anxiety, social anxiety, and depression).

We examined whether daily drinking motives predicted the likelihood of experiencing positive drinking consequences. We summarize two sets of findings across participants with and without SAD. First, social anxiety coping and anxiety coping motives predicted greater likelihood of perceived anxiety reduction. These findings are consistent with research linking higher coping motives with perceived anxiety reduction (Wycoff et al., 2021), as well as EMA research showing that tension-reduction expectancies predict perceived relief after drinking (Treloar et al., 2015). Second, participants were most likely to report increased sociability when they endorsed higher social anxiety coping or affiliation motives. Drinking to cope with social anxiety may facilitate behaviors that are incongruent with social anxiety, such as approach orientated behaviors (e.g., starting conversations) that provide opportunities for social connection.

CLINICAL CONSIDERATIONS

Preliminary study findings can inform clinical intervention. First, clinicians and patients can explore if/how alcohol is used as a coping tool. People with SAD often have trouble regulating emotions and lack confidence in regulatory abilities (Jazaieri et al., 2015), which might increase motivation to modify emotional states through drinking. Interventions that teach adaptive coping strategies (e.g., problem-solving) may reduce vulnerabilities to alcohol-related problems. Second, given that different drinking motives predicted different consequences (e.g., affiliation motives were associated with increased sociability), it might be helpful to explore how motives maintain alcohol use through positive consequences. Pleasure and reward are common targets in alcohol use treatment and people sometimes describe "honeymoon periods" of pleasure during early stages of use (Boden et al., 2016). Positive consequences strengthen expectations of positive outcomes in future drinking (e.g., Lee et al., 2018), and expectancies of positive social outcomes may mediate relationships between social anxiety and problematic drinking (e.g., Ham, 2009; Ham et al., 2016). Identifying positive drinking consequences could help detect problematic use.

LIMITATIONS AND FUTURE DIRECTIONS

Study limitations can inform future research. First, research can examine how consequences and motives differ across settings (e.g., Waddell et al., 2020). For example, solitary drinking may offer fewer social opportunities and lead to worse outcomes than social drinking (Terlecki et al., 2014), and social anxiety is associated with pre-event drinking (Buckner et al., 2020; Keough et al., 2016). Nonetheless, solitary drinking does not preclude social benefits; someone may "pregame" alone and then obtain social benefits once face-to-face (Calhoun & Linden-Carmichael, 2022) or through online interaction (e.g., social media). Future research can use ESM to capture trajectories of alcohol use before, during, and after different social interactions. Second, although our research questions are based on positive reinforcement frameworks, we did not examine how obtaining positive consequences predicted future drinking. We also measured four common drinking consequences relevant to social anxiety, but others can offer additional insight. For example, drinking may improve mood (Lee et al., 2017), which might be especially reinforcing for people with SAD who experience positivity deficits (e.g., Kashdan, 2007). Third, research can explore temporal relationships among drinking consequences. Participants may have experienced social consequences *because* of anxiety reduction, meaning anxiety reduction is a precursor of social rewards.

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Fourth, our ability to detect small to medium effects was constrained by our final sample size; several participants did not drink during the study and were not required to for participation. Our sample may be less representative of those with SAD who regularly drink. We are most limited in inferences that can be drawn from between-groups effects; smaller sample sizes at Level 2 are more problematic for model estimates than at Level 1 (Maas & Hox, 2005). Moreover, null results are not evidence of a lack of effect, and effect sizes from significant effects may be inflated. Fifth, AUD was not an inclusion or exclusion criterion. Given that comorbid SAD and AUD is associated with greater impairment than either alone (Schneier et al., 2010), research on this subgroup is important. Sixth, levels of coping motives were relatively low (especially depression), which might have limited ability to detect effects.

CONCLUSION

People with SAD are at risk for problematic alcohol use. The SAD–alcohol use relationship is often examined from a negative reinforcement framework, but people with SAD also experience benefits from drinking associated with positive reinforcement pathways. Our findings suggest that coping and affiliation motives are differentially associated with positive drinking outcomes, highlighting the benefit of assessing motives and consequences in tandem.

Conflict of Interest Statement

The authors declare that there are no conflicts of interest.

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