



Getting the party started – Alone: Solitary predrinking mediates the effect of social anxiety on alcohol-related problems[☆]



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HIGHLIGHTS

- Solitary predrinking tested as a mediator of the social anxiety-alcohol relation.
- High-risk pathway via solitary predrinking.
- Low-risk pathway via social predrinking.
- Solitary predrinking may be a target for clinical interventions.

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ABSTRACT

Predrinking (or pre-gaming) is common among undergraduates and has been linked with problem alcohol use. While many students predrink to save money, evidence suggests that some students predrink to cope with social anxiety (SA). Tension reduction and cognitive theories predict that those high in SA may predrink to reduce anticipatory anxiety before attending social events and their predrinking may be done alone rather than in normative social contexts. Available data suggest that, relative to social drinking, solitary drinking elevates risk for alcohol use and related problems. Informed by this evidence, we speculated that context for predrinking may be an important mechanism by which SA-risk for alcohol use unfolds. Specifically, we offered the novel hypothesis that those high in SA would engage frequently in solitary predrinking and this in turn would be associated with elevated alcohol use and related problems. Undergraduate drinkers ($N = 293$; 70% women) completed self-reports of social anxiety, predrinking context (social, solitary), alcohol use, and alcohol-related problems. In partial support of our hypotheses, SA was a positive predictor of solitary predrinking, which in turn predicted elevated alcohol-related problems, but not alcohol use. While not hypothesized, we also found that SA was a negative predictor of social predrinking, which in turn reduced risk for alcohol use and related problems. Our study is the first in the literature to show that solitary predrinking helps explain the well-documented association between SA and alcohol-related problems. These findings may inform etiological models and clinical interventions, suggesting that SA-risk for problem drinking begins even before the party starts.

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1. Introduction

Consuming alcohol before a social event is called *predrinking* or *pregaming* and is common among undergraduates. An estimated 85–95% of student drinkers reported predrinking at least once in the past month (LaBrie & Pedersen, 2008; Zamboanga, Schwartz, Ham, Borsari, & Van Tyne, 2010). Of concern, predrinking predicts heavy drinking over the course of a night, which leads to higher blood alcohol concentrations in those who predrink compared to those who do not (Clapp et al., 2009). Further, predrinking is linked to alcohol-related problems, such as physical injury and unplanned sex (Barnett, Orchowski, Read, & Kahler, 2013; Paves, Pedersen, Hummer, & LaBrie, 2012). This relation has been found even when controlling for other known risk factors for

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problem drinking such as binge drinking (Haas, Smith, Kagan, & Jacob, 2012). An improved understanding of undergraduate predrinking is an important direction for research, with findings having clinical as well as policy-level implications (Wells, Graham, & Purcell, 2009).

Social anxiety (SA) is an individual-level difference that has been found to relate to problem alcohol use (including predrinking) (see Schry & White, 2013 for a meta-analysis; Stewart, Morris, Mellings, & Komar, 2006). SA may be a particularly relevant risk factor for undergraduate drinking, as many students feel socially anxious at least occasionally, with 10–20% meeting criteria for Social Anxiety Disorder (SAD; Purdon, Antony, Monteiro, & Swinson, 2001; Strahan, 2003). Given that alcohol has anxiolytic effects, it has been theoretically argued that those high in SA drink to alleviate physiological and psychological symptoms of anxiety (Morris, Stewart, & Ham, 2005).

Many theories have been applied to understand the positive association between SA and drinking behavior. Of central relevance, tension reduction theory (TRT; Conger, 1956; Kushner et al., 1990) and the stress response-dampening model (SRD; Levenson, Sher, Grossman, Newman, & Newlin, 1980) predict that some (e.g., those high in SA) are particularly responsive to the anxiolytic effects of alcohol use and thus drink for negative reinforcement purposes. In turn, socially anxious individuals come to expect anxiety reduction from alcohol use and this increases alcohol use when anticipating or experiencing anxiety-provoking social situations (see Carrigan & Randall, 2003 for a review; Ham & Hope, 2005; Morris et al., 2005). Supporting this theory, research shows that SAD and alcohol use disorders are highly comorbid in clinical populations (Magee, Eaton, Wittchen, McGonagle, & Kessler, 1996). Also, research on non-clinical undergraduates reveals that elevated SA is consistently associated with alcohol-related problems, whereas SA's link to frequency of alcohol use in students is less clear (Buckner, Ecker, & Proctor, 2011; Buckner, Heimberg, Ecker, & Vinci, 2013). Yet, to date, much remains unknown about the key mechanisms underlying SA-related drinking in young adults.

While students often report predrinking to save money and to get “buzzed” prior to social events, another commonly endorsed reason for predrinking is to reduce SA (DeJong, DeRicco, & Schneider, 2010; Pedersen & LaBrie, 2007; Pedersen, LaBrie, & Kilmer, 2009). Complimenting TRT and SRD, Clark and Wells (1995) cognitive model of social phobia posits that socially anxious persons experience considerable anxiety before attending social gatherings due to anticipatory negative self-appraisal. To illustrate, before an event, those high in SA are likely to review what the event may be like and during this process, their thoughts tend to be consumed by past social failures, by negative images of themselves at the upcoming social event, and by beliefs about upcoming poor social performance and rejection from peers (Clark, 2001; Eckman & Shean, 1997). This negative self-appraisal process results in elevated social anxiety and may even result in avoidance of the event altogether (Mellings & Alden, 2000). For those who do attend the event, anticipatory processing primes them to be critical of their social competence/performance and be less likely to notice signs of peer acceptance (Battista & Kocovski, 2010; Clark, 2001).

The above-mentioned theories predict that anticipatory anxiety may be a central trigger for predrinking in socially anxious individuals. Predrinking may serve to dampen anticipatory anxiety and to disrupt the ruminative, negative self-appraisal process – thus, increasing the likelihood of attending the social event and reducing self-focus. Moreover, given that those high in SA fear social interactions, they are likely to predrink alone before encountering others. While no studies to date have examined solitary predrinking in the SA-alcohol problem pathway, a growing literature on drinking context supports differential risk associated with solitary versus social drinking. Many students drink in social situations (e.g., with friends) and this type of drinking is linked to problem drinking. However, 15% of students drink outside normative social contexts (Neff, 1997; O'Hare, 1990) and this is thought to be especially risky (Keough, O'Connor, Sherry, & Stewart, 2015). Solitary drinkers tend to consume alcohol more often and have more alcohol-

related problems than social drinkers (Christiansen, Vik, & Jarchow, 2002; Holyfield, Ducharme, & Martin, 1995). Also, those who view alcohol as a means of reducing anxiety or stress are twice as likely as those without such beliefs to engage in solitary drinking (Bourgault & Demers, 1997). Relatedly, compared to normative social drinking, solitary drinking has been shown to prospectively predict increased alcohol problems later in life (Abbey, Smith, & Scott, 1993; Creswell, Chung, Clark, & Martin, 2013; Gonzalez & Skewes, 2012).

Based on theory, we propose that solitary predrinking may help explain the positive association between SA and problematic drinking. Specifically, it may be *through* frequent solitary predrinking that SA leads to heavy alcohol use and alcohol-related problems. In other words, the tendency of socially anxious young people to engage in solitary predrinking prior to feared social events may mediate their risk for adverse drinking outcomes. We hypothesized that elevated SA would predict more frequent solitary predrinking, which in turn would predict heavy use and experiencing alcohol-related problems.

2. Materials and methods

2.1. Procedure and participants

The current study was approved by the Health Sciences Research Ethics Board at Dalhousie University. Data for the current study was pulled from a larger study on personality and drinking motives (Mackinnon, Kehayes, Clark, Sherry, & Stewart, 2014). Some participants were recruited from an online psychology participant pool at Dalhousie, while others were recruited using flyers posted around the community where the study took place. The only inclusion criteria were that individuals had to be current university/college students and had to have some drinking experience (≥ 4 drinking occasions in the past month). Participants were screened for these criteria through a mass screening protocol if they were part of the online psychology participant pool or via telephone screening interviews if they were recruited from the community. Participants completed self-report measures on the computer in the lab and were compensated financially (\$10/h) or with course credit.

The initial sample was $N = 302$, but due to extensive missing data ($>50\%$) on key study variables from some participants, the final sample of undergraduate drinkers was 293 (70% women; $M_{age} = 20.34$ years, $SD = 3.72$). The majority of participants were Caucasian (90.0%), and minority ethnicities represented were Asian Canadian (3.0%), African Canadian (1.4%), Hispanic (1.0%), and Aboriginal (0.6%). Another 4.0% reported ethnicity as “other.”

2.2. Questionnaire measures

2.2.1. Social Interaction Anxiety Scale (SIAS; Mattick & Clarke, 1998)

The SIAS was used to measure SA. This 20-item self-report questionnaire examines anxiety in several different social situations (e.g., “I tense up if I meet an acquaintance in the street”). Participants indicate how each statement describes them on a 5-point scale (0 = not at all characteristic or true of me; 4 = extremely characteristic or true of me). Mean scores were calculated for each participant. The SIAS has been shown to have good internal consistency ($\alpha = .83$) and excellent test-retest reliability ($r = .92$) (Mattick & Clarke, 1998). Supporting concurrent validity, the SIAS total score correlates highly with other widely used measures of SA (Caballo, Salazar, Iruiria, Arias, & Nobre, 2013). Our internal consistency was good-to-excellent ($\alpha = .86$).

2.2.2. Predrinking contexts

Adapted from Cooper's (1994) typical drinking contexts measure, students rated how often they predrank alone (single item) and with friends (five items: with one same-sex friend, one-opposite sex friend, multiple-same sex friends, multiple-opposite sex friends, and multiple-mixed sex friends) in the past 6-months. Responses were on

a 5-point scale (1 = almost never/never; 5 = almost always/always). The solitary predrinking variable was a single item in the path analysis, whereas, the social predrinking variable was treated as a latent variable.

2.2.3. Alcohol use

Participants indicated on how many days, in a typical week in the past month, they had consumed alcohol (response range was 0 to 7 days per week). Participants also indicated the typical number of drinks they consumed on a day that they drank alcohol. Responses to the frequency and quantity items were multiplied to yield a composite reflecting total weekly alcohol use. This is a common measure in alcohol research and has been shown to be accurate when certain conditions are met (e.g., participants are ensured confidentiality; Keough & O'Connor, 2014; Sobell & Sobell, 1990).

2.2.4. Rutgers Alcohol Problem Index (RAPI; White & Labouvie, 1989)

The RAPI is a 23-item measure of alcohol-related problems experienced among young people. Participants indicated how often they experienced each problem in the past 6-months. Responses were on a 5-point scale (0 = never; 4 = > 8 times). Sum scores were calculated. Previous research supports good internal consistency, test-retest reliability, and concurrent validity of the RAPI in undergraduates (Miller, Miller, Verhegge, Linville, & Pumariega, 2002). Our alpha was .90, which is excellent.

2.3. Data analytic overview

Descriptives and correlations were inspected for all variables. Next, the hypothesized model was evaluated using the recommended two-step approach to testing structural equation models (Kline, 2010). Model fit was evaluated at each step. Fit to the data was described as excellent if the Comparative Fit Index (CFI; Bentler, 1990) and the Tucker-Lewis Index (TLI; Tucker & Lewis, 1973) were greater than .95, the Root Mean Square Error of Approximation (RMSEA) was less than .05 (Hu & Bentler, 1999), and the model χ^2/df ratio was less than 3.0 (Kline, 2010). In the first step, the measurement model was evaluated. The five predrinking with friends variables were estimated as indicators of the social predrinking latent factor and a saturated covariance matrix was estimated among the latent social predrinking and observed social anxiety, solitary predrinking, and alcohol outcome variables. In the second step, the hypothesized structure was tested. The saturated covariance matrix was replaced with hypothesized paths. To control for shared variance, covariances were estimated among predrinking contexts and among drinking outcomes. Nested model (step 1 vs. step 2) comparison was used to test change in fit with the addition of structure. Cheung and Rensvold (2002) recommend that a $\Delta CFI \geq 0.01$ indicates a decrement in model fit, when comparing nested models. Also, an AIC or BIC change of 4 units or greater indicates a significant decrement in model fit (Burnham & Anderson, 2002). We report the χ^2 difference test as well, but we did not weigh it as highly because it is very sensitive to large sample size (Kline, 2010). Overall, if both models have comparable fit, structure (and in this case mediation) is supported. Further, bias corrected bootstrapping was used to test the presence and magnitude (95% confidence intervals [CI]) of hypothesized indirect effects. Mediation is said to be present if the indirect effect CI does not contain zero (Fritz & MacKinnon, 2007).

3. Results

3.1. Data screening

Data screening revealed that some variables were not normally distributed (see Table 1) (skew > 3.0; kurtosis > 10; Kline, 2010), which frequently occurs with drinking variables in non-clinical samples (Miller et al., 2002). To correct for this, we used robust maximum likelihood estimation (MLR) in MPlus 7.0 to calculate path coefficients

Table 1
Descriptive statistics and bivariate correlations.

	1	2	3	4	5
1. Social anxiety	1.00	.16**	-.19**	-.12*	.08
2. Solitary predrinking		1.00	-.08	.04	.11*
3. Social predrinking			1.00	.27**	.13*
4. Total weekly alcohol use				1.00	.53**
5. Alcohol-related problems					1.00
M	1.11	1.22	2.61	9.92	9.86
SD	0.71	0.51	0.99	7.64	8.38
Skew	6.28	16.07	1.21	14.57	10.89
Kurtosis	0.50	15.14	2.14	19.53	8.38

* $p < .05$.

** $p < .01$.

and fit indices. MLR and bootstrapping are robust to violations of multivariate normality (Muthén & Muthén, 2012).

3.2. Descriptive statistics and bivariate correlations

See Table 1 for descriptive statistics and bivariate correlations. Compared to previous work in undergraduate drinker samples, our sample had similar weekly alcohol use and related problems (Grant et al., 2009). Students reported predrinking most frequently with friends and least frequently alone ($t_{(292)} = -20.99, p < .001$). As expected, SA was positively correlated with solitary predrinking. Interestingly, SA was negatively correlated with social predrinking. Regarding drinking behavior, SA was negatively associated with total weekly alcohol use, which is consistent with some extant work (Buckner et al., 2013). While the bivariate correlation between SA and alcohol-related problems was unexpectedly not statistically significant, the partial correlation (controlling for use) was positive and significant (partial $r = .14, p = .02$). Solitary predrinking was positively correlated with alcohol-related problems, but not use. Social predrinking was positively correlated with both drinking outcomes.

3.3. Preliminary model testing

The initial measurement model provided poor fit to the data ($\chi^2_{(21)} = 134.367, p = .000, \chi^2/df = 6.398, CFI = 0.814, TLI = 0.682, RMSEA = 0.136$ [90% CI = 0.114, 0.158]). Inspection of the model revealed that two indicators of the social predrinking latent mediator (predrinking with one same sex friend and with one opposite sex friend) had relatively low factor loadings (<0.55) (Comrey & Lee, 1992). Accordingly, these items were trimmed and the model was reevaluated. It also makes sense conceptually to remove these items because we were interested in capturing group social predrinking rather than dyadic predrinking. This trimming led to appreciable improvements in model fit (Satorra and Bentler's [2010] chi-square difference test for models estimated in MLR: $\Delta\chi^2 = 127.687, p < .001; \Delta CFI = 0.186; \Delta AIC = 1575.421; \Delta BIC = 1578.482$) and the new fit of the measurement model was excellent: $\chi^2_{(8)} = 5.502, p = .703, \chi^2/df = 0.687, CFI = 1.00, TLI = 1.00, RMSEA = 0.000$ [90% CI = 0.000, 0.052].

Fit of the structural model was excellent ($\chi^2_{(10)} = 12.918, p = .228, \chi^2/df = 1.291, CFI = .993, TLI = 0.985, RMSEA = 0.032$ [90% CI = 0.000, 0.075]). The addition of structure did not lead to appreciable decrements in model fit, with the exception of the χ^2 difference test ($\Delta\chi^2_{(2)} = 6.980, p < .05; \Delta CFI = 0.007; \Delta AIC = 0.354; \Delta BIC = 2.389$). Given that 3 out of 4 model comparison indices suggest no reductions in model fit, and our a priori plan to weight chi square difference tests less strongly, we retained the final model presented in Fig. 1.

3.4. Hypothesis testing

Effects from SA to drinking outcomes and from predrinking contexts to drinking outcomes represent unique associations after controlling for shared variance. As expected, SA was a statistically significant positive

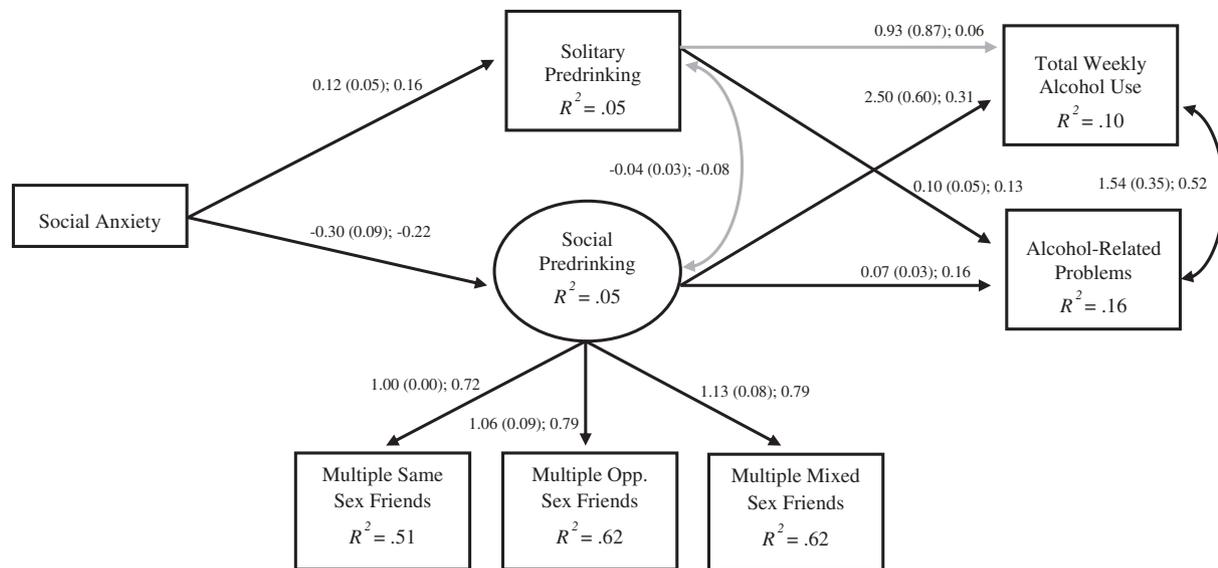


Fig. 1. This figure is the final structural model for social anxiety predicting drinking outcomes as mediated by predrinking contexts. Path estimates are presented as follows: unstandardized coefficient (standard error); standardized coefficient. Bold paths represent specified paths that were statistically significant ($p < .05$) and gray lines are non-significant paths.

predictor of solitary predrinking. Interestingly, SA was also a statistically significant negative predictor of social predrinking. As hypothesized, solitary predrinking was a statistically significant positive predictor of alcohol-related problems, but was unexpectedly not a statistically significant predictor of alcohol use. Social predrinking was a statistically significant positive predictor of both drinking outcomes.

Bias-corrected bootstrapped 95% CIs were used to test indirect effects. As expected and reflecting mediation, the indirect effect from SA to solitary predrinking to alcohol-related problems was supported ($b = 0.012$, 95% CI [0.002, 0.028], $\beta = 0.020$, 95% CI [0.001, 0.040]). Those with elevated SA engaged in more frequent solitary predrinking, which in turn predicted elevated alcohol-related problems. Counter to hypotheses, the indirect effect from SA to solitary predrinking to alcohol use was not supported ($B = 0.108$, 95% CI [-0.058, 0.353], $\beta = 0.014$, 95% CI [-0.011, 0.034]). Furthermore, we found support for unexpected mediation effects from SA to social predrinking to both alcohol use ($B = -0.737$, 95% CI [-1.370, -0.295], $\beta = -0.067$, 95% CI [-0.116, -0.019]) and related problems ($B = -0.020$, 95% CI [-0.045, -0.006], $\beta = -0.035$, 95% CI [-0.068, -0.003]). Those with elevated SA predrank infrequently in social settings, which in turn protected them against heavy alcohol use and experiencing related-problems.¹

4. Discussion

Our goal was to examine the mediating role of solitary predrinking in the SA pathway to alcohol use and related problems. Supporting hypotheses, we found that SA was associated with relatively more solitary predrinking and this in turn predicted experiencing elevated alcohol-related problems. However, this effect was not observed for alcohol use. Interestingly, although not initially hypothesized, SA was associated with infrequent social predrinking and this in turn protected against heavy drinking and experiencing related problems. Our study is novel because we advance the understanding of predrinking context

as a theoretically relevant mediator underlying SA-related alcohol use risk.

There are previous data to support the association between SA and predrinking (DeJong et al., 2010; Pedersen & LaBrie, 2007); however, to date, no attention has been given to the role of context for predrinking. This is surprising because motivational theories of addiction have long posited that individual differences, like SA, and contextual factors are important predictors of drinking behavior (Cox & Klinger, 1988; Keough et al., 2015; Krank, Wall, Stewart, Wiers, & Goldman, 2005). Theory suggests that anticipatory anxiety should be a central trigger for use among those high in SA. Negative self-appraisal and cognitive forecasting of upcoming social failures is associated with increased anticipatory anxiety (e.g., being socially awkward and not fitting in; Clark & Wells, 1995). Accordingly, those high in SA may engage in predrinking alone to “take the edge off” and reduce self-focus before attending social gatherings. Given that predrinking leads to greater alcohol consumption and experiencing related problems over the course of the night, solitary drinking may be a critical mechanism underlying SA-risk. While we did not assess anticipatory anxiety directly, our study supports this assertion.

In previous work on context and depression-related drinking (Keough et al., 2015), we found evidence for *high-risk* (through frequent solitary drinking) and *low-risk* (through infrequent social drinking) pathways to alcohol use. The current study findings support similar pathways in socially anxious individuals. First, we found that SA was predicted elevated alcohol-related problems (but not heavy drinking) via solitary predrinking. In university, heavy drinking is normative and is commonly encouraged by peers in social settings (e.g., parties; Johnston, O'Malley, & Bachman, 1998). However, when a socially anxious individual engages in solitary predrinking, there are no drinking companions to facilitate heavy drinking. Furthermore, another possibility is that, although solitary predrinking may make attending social events more palatable for those high in SA, they may remain cautious about heavy drinking overall because intoxication can lead to regretful and embarrassing behaviors which they fear (Schry & White, 2013). This may be reflected in our finding that at the zero order level, SA was negatively correlated with levels of alcohol use. Nevertheless, while solitary predrinking was unrelated to amount of alcohol consumed, those who drank alone frequently encountered problems. The high levels of coping motives endorsed by solitary drinkers (Cooper, 1994; Gonzalez et al., 2009) may help explain this finding. Specifically, the literature demonstrates that solitary drinkers tend to be those

¹ While the hypothesized model testing full mediation provided excellent fit to the data, we acknowledge some readers may want to see if a direct effect from SA to alcohol-problems remains in the model with mediators included. In follow-up analyses, we added a direct effect from SA to alcohol-related problems and this effect was not statistically significant ($B = 0.060$, $SE = 0.033$, $p = .09$). Thus, the hypothesized model testing full mediation was retained and reported.

who drink to cope with negative affect (Bourgault & Demers, 1997; Christiansen et al., 2002). A consistent finding is that coping-related drinking is associated with alcohol problems, irrespective of level of alcohol use (Kuntsche, Knibbe, Gmel, & Engels, 2005). Future work should examine the additional mediating role of coping motives to explain why solitary predrinking increases alcohol-related problem risk among socially anxious individuals.

Second, we found evidence of a low-risk pathway via social predrinking. That is, socially anxious individuals predrank infrequently around others – which in turn, protected them against heavy drinking and related problems. While we did not initially hypothesize this pathway, it is consistent with theory and with our previous work (Keough et al., 2015). Essentially, predrinking with others is a social event that should provoke anxiety among socially anxious individuals. Similar to their emotional experience before a party, it is likely that persons high in SA experience anticipatory anxiety and thus they may avoid social predrinking altogether (Clark & Wells, 1995). Or, also possible, is that they may engage in predrinking alone before attending social predrinking gatherings. Moreover, while our results suggest that those high in SA are unlikely to predrink in group settings, an interesting topic of future research is to examine dyadic predrinking. We initially had two items tapping into this construct, but we chose to drop these from the analysis due to poor factor loadings and because we were primarily interested in group social predrinking. We speculate that socially anxious individuals may engage in dyadic predrinking if they are with someone who is close to them and with whom they feel comfortable (e.g., a close friend). Future research on SA and predrinking contexts should examine the role of dyadic predrinking.

Our results have clinical implications for reducing SA-related drinking and associated problems. As we suggested in our previous work (Keough et al., 2015), context for drinking is a malleable target for interventions. With respect to the current study, drinking before social events is a common practice among young adults in university and research shows that there are clear risks associated with predrinking (Barnett et al., 2013; Paves et al., 2012). Our results add nuance to this literature by showing that there are differential risks based on context for predrinking. Solitary drinking seems to be most common among those who drink for coping-related reasons (Christiansen et al., 2002; Holyfield et al., 1995; Keough et al., 2015) and is considered an early indicator of pathological drinking (Abbey et al., 1993; Creswell et al., 2013). Psychoeducation about the dangers of solitary predrinking (and solitary use in general) may be effective for ameliorating risky drinking among those high in SA. Skills training may also be helpful for those high in SA, in order for them to learn more adaptive strategies for managing anxiety prior to social events.

There are some limitations of our study. First, our study is cross-sectional – thus we cannot make assertions about predrinking contexts as causal mechanisms in the SA-pathway to alcohol use and problems. A related point concerns the temporal sequence of variables in our model, in that all variables were retrospectively assessed. Future work should aim to replicate and expand on the present results by using daily diary methods to have a tighter temporal coupling between SA, anticipatory anxiety, predrinking context, and alcohol use outcomes. Second, there are sex differences in SA and in alcohol use (Nolen-Hoeksema, 2004; Norberg, Oliver, Alperstein, Zvolensky, & Norton, 2011; Norberg, Norton, & Olivier, 2009; Turk et al., 1998). The high ratio of women to men in our study precluded us to examine the potential role of sex in our model. Future work should aim to test sex-specific models in a more balanced sample.

In conclusion, this study is the first to integrate predrinking context into etiological models of SA-related drinking. Within our model, solitary predrinking is important for explaining the well-documented positive association between SA and alcohol problems (Buckner et al., 2013; Schry & White, 2013). This study tested a theoretically sound model of SA-related drinking and our model directly points to future directions for research on SA and predrinking.

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Contributors

All authors contributed meaningfully to the conceptual model presented in the manuscript. Matthew T. Keough conducted literature searches and wrote the first draft of the manuscript with Dr. O'Connor's constant and significant feedback on all aspects of the paper. Dr. Battista contributed to writing the introduction, methods, and results. Drs. Stewart and Sherry designed the study, collected the data as a part of a larger longitudinal study, and provided significant edits on the entire manuscript. The final manuscript reflects the combined substantial effort of all co-authors and together we declare that we approve of this submission.

Conflict of interest

All authors declare that they have no conflicts of interest.

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