The Role of Underutilization of Protective Behavioral Strategies in the Relation of Social Anxiety with Risky Drinking

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Meredith A. Terlecki[a,*]

University of East London

Anthony H. Ecker[b]

VA South Central Mental Illness Research, Education, and Clinical Center

Baylor College of Medicine

Julia D. Buckner[c]

Louisiana State University

[a] School of Psychology, University of East London, Water Lane, Stratford, London E15 4LZ, United Kingdom. Email: m.terlecki@uel.ac.uk.

[b] Menninger Department of Psychiatry and Behavioral Sciences, Baylor College of Medicine, One Baylor Plaza, Houston, TX 77030, USA

[c] Department of Psychology, Louisiana State University, 236 Audubon Hall, Baton Rouge, LA 70803, USA

*Correspondence concerning this article should be addressed to Meredith Terlecki, School of Psychology, University of East London, Water Lane, Stratford, London E15 4LZ, United Kingdom. Phone: +44(0)20 8823 4463 Email: m.terlecki@uel.ac.uk

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ABSTRACT

Social anxiety is prominent among undergraduates and increases the risk of experiencing alcohol problems. In fact, social anxiety more than quadruples the risk of developing an alcohol use disorder, yet it is inconsistently related to heavier drinking. Inconsistent findings may be due to lack of attention on protective behavioral strategies (PBS) among socially anxious drinkers. PBS are cognitive-behavioral strategies to reduce drinking and alcohol-related harm. Due to the nature of social anxiety, affected individuals may be especially vulnerable to PBS underutilization, leading to heavier and more problematic drinking. The current study examined the mediating role of PBS in the relationships of social anxiety with past-month drinking and alcohol problems using cross-sectional data among current (past-month) heavy undergraduate drinkers (*N* = 431). Social anxiety was significantly positively related to past-month alcohol problems and peak drinking. Social anxiety was significantly negatively related to typical drinking, drinking frequency, and PBSS Manner of Drinking. Social anxiety was indirectly (via PBSS Manner of Drinking) related to greater past-month peak drinks and more drinking problems. Findings suggest that socially anxious persons may be vulnerable to heavier and more problematic drinking due to PBS underutilization. Treatment implications are discussed.

Keywords**:** social anxiety; college alcohol use; protective behavioral strategies; drinking problems

1. Introduction

1.1 Undergraduate drinking

Undergraduate alcohol use remains problematic with over 30% of undergraduates endorsing heavy drinking (i.e., more than 5 consecutive drinks) and 12% endorsing extreme heavy episode drinking (i.e., more than 10 consecutive drinks; Schulenberg, et al., 2017). The undergraduate drinking environment may further exacerbate risky drinking among socially anxious drinkers (Ham & Hope, 2005), for example via drinking to cope with anxiety from meeting new people or participating in novel social situations (Ham, Zamboanga, Bacon & Garcia, 2009). This observation is concerning because social anxiety disorder more than quadruples the risk of developing an alcohol use disorder (Buckner, Schmidt, et al., 2008; Kushner, Abrams & Borchardt, 2000) and social anxiety symptoms generally onset before alcohol use disorder symptoms (Buckner, Timpano, Zvolensky, Sachs-Ericsson & Schmidt, 2008), making the college years an important intervention period for at-risk socially anxious drinkers.

Ample research suggests that students with elevated socially anxiety experience more alcohol problems than drinkers with more normative levels of social anxiety (for review, see Buckner, Heimberg, Ecker & Vinci, 2013) and this relationship persists even after socially anxious drinkers undergo alcohol treatment (Terlecki et al., 2011). Although the mechanism underlying the relationship between social anxiety and greater alcohol problems is not fully understood, the relationship appears to be mediated by a range of variables such as greater alcohol expectancies (Ham, Bacon, Carrigan, Zamboanga & Casner, 2016), greater susceptibility to perceived peer drinking norms (Buckner, Ecker & Proctor, 2011; Terlecki, Buckner, Larimer & Copeland, 2012), and stronger coping and conformity motives (Buckner & Shah, 2015; Ham, Bonin & Hope, 2007; Ham, et al., 2009; Stewart, Morris, Mellings & Komar, 2009; Terlecki & Buckner, 2015). Drinking behavior may also differ such that highly socially anxious drinkers may drink in smaller group settings (Terlecki, Ecker, & Buckner, 2014). For

example, during ‘pre-gaming’ or drinking before going out (Keough, Battista, O'Connor, Sherry & Stewart, 2016), which may render highly socially anxious drinkers vulnerable to becoming intoxicated more quickly, and are therefore more likely to experience greater alcohol problems.

The research findings are less clear with respect to social anxiety and drinking quantity. For example, some studies have shown a positive relation between social anxiety and drinking quantity (e.g., Neighbors, et al., 2007; Stewart, et al., 2009; Terlecki, Buckner, Larimer & Copeland, 2011) but others have shown social anxiety to be inversely (e.g., Eggleston, Woolaway-Bickel & Schmidt, 2004; Ham & Hope, 2005) or unrelated to alcohol use quantity (e.g., Bruch, Heimberg, Harvey & McCann, 1992; Bruch, Rivet, Heimberg & Levin, 1997; Buckner, et al., 2011; Buckner, Mallott, Schmidt & Taylor, 2006; Ham & Hope, 2006; O'Grady, Cullum, Armeli & Tennan, 2011). Emerging research suggests the inconsistent relationship between social anxiety and drinking quantity may exist because socially anxious drinkers may not necessarily drink heavier or more frequently in general. In fact, among some socially anxious individuals, alcohol and social situations involving alcohol could be avoided altogether (Eggleston, et al., 2004). Yet socially anxious persons who choose to drink alcohol appear vulnerable to heavier drinking in specific settings ("pre-gaming"; Keough, et al., 2016; e.g., in small intimate groups; Terlecki, Ecker & Buckner, 2014) as a means to cope with their anxiety or conform to perceived social drinking practices or expectations (Buckner & Shah, 2015; Ham, et al., 2007; Lewis, et al., 2008; Stewart, et al., 2009; Terlecki & Buckner, 2015). Given that social anxiety disorder appears to be a risk factor for developing an alcohol use disorder (Buckner, Timpano, et al., 2008), it is important to examine possible predictors of heavy drinking quantity to further elucidate this relationship and help inform treatment efforts for this vulnerable group.

1.2 Protective strategies

Protective Behavioral Strategies (PBS) are cognitive and behavioral harm-reduction strategies to decrease alcohol use and alcohol problems (e.g., using a designated driver, spacing alcoholic drinks). Greater PBS use is associated with reduced drinking and fewer

alcohol problems among undergraduates (Araas & Adams, 2008; D'Lima, Pearson & Kelley, 2012; Labrie, Lac, Kenney & Mirza, 2011; Patrick, Lee & Larimer, 2011; Ray, Turrisi, Abar & Peters, 2009). Thus, college drinking prevention interventions often include a PBS component (Dimeff, Baer, Kivlahan & Marlatt, 1999; Kypri, et al., 2009; Murphy, et al., 2012) and post-intervention PBS use mediates the efficacy of such interventions (Barnett, Murphy, Colby & Monti, 2007; Larimer, et al., 2007; Murphy, et al., 2012).

1.3 PBS use among vulnerable drinkers

PBS use has been found to mediate (LaBrie, Kenney & Lac, 2010; LaBrie, Kenney, Lac, Garcia & Ferraiolo, 2009; Linden, Lau-Barraco & Milletich, 2013), partially mediate (Martens, et al., 2008), and moderate (Merrill, Reid, Carey & Carey, 2014) the relation between alcohol problems and negative affect conditions such as depression (Martens, et al., 2008; Merrill, et al., 2014), anxiety (Linden, et al., 2013) and poor mental health/general negative affect (LaBrie, et al., 2010; LaBrie, et al., 2009) among undergraduates. Higher PBS use reduces drinking and related consequences among these vulnerable groups (LaBrie, et al., 2010; LaBrie, et al., 2009; Martens, et al., 2008). Taken together, these findings suggest that PBS use could play a key role in reducing drinking and related problems among at-risk negative affect drinkers.

1.4 PBS use among socially anxious drinkers

Despite accumulating evidence that PBS may play an important role in reducing drinking and alcohol problems among other groups with chronically elevated negative affect, little research has examined the role of PBS in drinking among socially anxious persons. Among socially anxious drinkers, PBS may be used less frequently or less effectively due to competing cognitive demands, including monitoring physiological anxiety symptoms (e.g., sweating, blushing), over-attending to social cues (e.g., monitoring for disapproval or social threats), maintaining a self-critical internal dialogue (Clark & McManus, 2002; Clark & Wells, 1995), and avoiding practicing new social skills in high-risk situations. Additional alcohol-related cognitive impairment may render PBS even more difficult to effectively implement in certain evaluative

social drinking situations (e.g., meeting new people at parties), which is concerning given that high social anxiety drinkers are vulnerable to heavy drinking before they go out (Keough, et al., 2016) and therefore may be too intoxicated to practice or implement new social skills. In summary, high social anxiety drinkers under the influence of alcohol may not possess the additional cognitive resources required to activate novel coping skills in situ and also might avoid using strategies that require practicing new social skills (e.g., refusing drinks or declining drinking games participation) rendering them vulnerable to not effectively using PBS strategies.

In further support of this idea, among socially anxious drinkers, observation fears serve a risk factor for alcohol use disorders, such that those with greater observation fears are most vulnerable to heavy drinking and/or experiencing alcohol problems (Buckner & Schmidt, 2009). As such, socially anxious drinkers who are under the influence of alcohol might be less willing or capable of engaging in particular PBS that are feared to result in social scrutiny (e.g., avoid drinking games, avoid drinking to “keep up;” as per the PBSS Manner of Drinking subscale) as opposed to less obvious PBS (e.g., putting extra ice in your drink; as per the PBSS Stopping/Limiting subscale). Understanding whether highly socially anxious drinkers are vulnerable to heavy drinking and related problems via underutilizing particular group of PBS could help inform prevention efforts within this at-risk group.

In the only other known study of PBS and social anxiety, Serious Harm Reduction (e.g., use a designated driver, go home with a friend) mediated the relation between social anxiety and alcohol problems, controlling for alcohol consumption (Villarosa, Moorer, Madson, Zeigler-Hill & Noble, 2014). Although an important first step in this line of research, Villarosa et al. utilized a modified 18-item two-factor Protective Behaviors Strategies Survey (PBSS-R; Madson, Arnau & Lambert, 2013), which merged items from two subscales (Stopping/Limiting & Manner of Drinking) from the 15-item PBSS measure (Martens, et al., 2005) into one Controlled Consumption subscale. Thus, the finding that the PBSS-R Controlled Consumption did not mediate the social anxiety and alcohol problem association may have occurred due to nature of

the constructed subscale because socially obvious PBS strategies loading into the original PBSS Manner of Drinking could not be isolated (Villarosa, et al., 2014). In other words, it is important to further test the PBS-social anxiety relation for several reasons. First, the PBSS-15 and adapted PBSS-20 are the most widely used and empirically validated measure of PBS (Martens, Pederson, Labrie, Ferrier & Cimini, 2007; Treloar, Martens & McCarthy, 2015) and psychometric evaluation studies show that a 3-factor solution offers a better fit and greater predictive validity of alcohol outcomes vs a 2-factor solution (Martens, et al., 2007; Treloar, et al., 2015), such as that employed in Villarosa et al. (2014). Second, combining the PBSS subscales of Manner of Drinking and Stopping/Limiting subscales into one Controlled Consumption subscale as was done in the PBSS-R (Madson, et al., 2013), makes it unclear which PBS consumption strategies socially anxious drinkers may or may not utilize. Third, longitudinal data examining the relationship of PBSS subscales and alcohol outcomes show that the PBSS Manner of Drinking subscale significantly predicted reduced drinking and decreased alcohol problems whereas Serious Harm Reduction predicted only decreased alcohol problems, no such relationship was observed with the PBSS Stopping/Limited subscale (Napper, Kenney, Lac, Lewis & LaBrie, 2014). However, in Villarosa et al. (2014) alcohol quantity was not examined as an outcome variable, which limits insight into whether PBS use plays a role in the relation between social anxiety and drinking quantity as well as alcohol problems. This limitation is important given that accumulating evidence suggests that socially anxious persons may drink more heavily in certain high-risk situations (Terlecki, et al., 2014).

1.5 The current study

We sought to further elucidate the role of PBS in the relations between social anxiety and drinking outcomes in several ways. Specifically, using cross-sectional data, we sought to extend the Villarosa et al. (2014) finding in two key ways: (1) we examined PBS strategies among social anxious drinkers using the original 3-factor PBSS solution (Martens, et al., 2005) using the updated PBSS-20 (Treloar, et al., 2015) to elucidate which specific PBS may be

underutilized by high social anxiety drinkers; and (2) we included drinking quantity as an outcome variable. We hypothesized that PBSS Manner of Drinking subscale, which contains more obvious (e.g., avoiding pre-gaming) and socially-interactive PBS items (e.g., avoiding drinking games, trying not to out-drink others) would mediate the relation between social anxiety and alcohol outcomes, suggesting that greater drinking and more problems may arise for socially anxious drinkers due to underutilization of PBS strategies that may be likely to result in social ridicule or negative evaluation. Consistent with Villarosa et al. (2014), we hypothesized that PBSS Serious Harm Reduction subscale would mediate the relationship between social anxiety and alcohol problems.

These hypotheses were tested among heavy drinking undergraduate students given that research consistently shows that college students experience greater alcohol impairment relative to non-college attending peers (Blanco, et al., 2008; Johnston, et al., 2016; Knight, et al., 2002; Slutske, 2005). Social anxiety often increases when young adults make the transition to college (Spokas & Heimberg, 2009). Social anxiety also appears to be a unique risk factor for alcohol use disorder (Kessler, et al., 2005; Torvik, et al., 2019). Concerningly, approximately 80% of undergraduates with poorer mental health, such as social anxiety, engage in heavy episodic drinking to ‘get drunk’ relative to their peers (Weitzman, 2004) and experience negative alcohol harms, making heavy drinking socially anxious students an important research priority group.

2. Materials and Methods

2.1 Procedure

Participants were recruited through the psychology participant pool from at a large state university in the southern United States for a study on college substance use. Participants completed computerized self-report measures using a secure, on-line data collection website (www.surveymonkey.com). Participants received research credit for their psychology courses and referrals to university-affiliated psychological outpatient clinics for completion of the survey.

The university's Institutional Review Board approved the study and all participants provided informed consent prior to data collection.

2.2 Participants

Of the 586 students who completed the survey, 432 endorsed at least one episode of past-month heavy drinking (≥4 drinks/occasion for women, ≥5 drinks/occasion for men) and were eligible for the current study. Of those, 1 was excluded to due questionable validity of their responses (described below). The final sample of 431 was included in the data analysis.

2.3 Measures

2.3.1 Alcohol use

The *Daily Drinking Questionnaire* (DDQ; R. L. Collins, Parks & Marlatt, 1985) measured past-month drinking quantity and drinking frequency. Participants were shown a graphic containing a variety of standard drinks and then asked to record their past month drinking on a scale of 0 drinks to more than 30 drinks on both average drinking occasions (typical drinks) and heavy drinking occasions (peak drinks). The drinking quantity variables were calculated by taking the mean daily reported number of drinks consumed on average drinking occasions (typical drinks) and heavy drinking occasions (peak drinks). Past month drinking frequency was rated on a Likert scale ranging from 0 (*did not drink at all*) to 6 (*once a day or more*). Drinking frequency was used as a co-variate in the analyses. The DDQ has good convergent validity (R. L. Collins, et al., 1985) and test-retest reliability (S. E. Collins, Carey & Sliwinski, 2002).

2.3.2 Alcohol problems

Alcohol problems were assessed with the past-month version of the 23-item *Rutgers Alcohol Problems Index* (RAPI; White & Labouvie, 1989). Both the original and the past-month versions of the RAPI have demonstrated adequate psychometric properties (White & Labouvie, 1989). Consistent with prior work (e.g., Morean & Corbin, 2008), endorsed items were summed to provide a total count of alcohol-related problems. In our sample, the RAPI demonstrated good internal consistency (α =.89).

2.3.3 Protective Strategies

The Protective Behavioral Strategies Survey-20 (PBSS-20; Treloar, et al., 2015) assessed cognitive and behavioral strategies used to prevent harms associated with heavy drinking using a total score and also across three distinct subscales: stopping/limiting drinking (e.g., *stop drinking at a certain time, putting extra ice in your drink*), manner of drinking (e.g., *avoid drinking games, 'pre-gaming'*); and serious harm reduction (e.g., *use a designated driver*). The PBSS demonstrated good internal consistency in the current sample for PBSS total (α = .87), PBSS Stopping/Limiting (α = .83), Manner of Drinking (α = .82), and Serious Harm Reduction (α = .85).

2.3.4 Social Anxiety

The *Social Interaction Anxiety Scale* (SIAS; Mattick & Clarke, 1998) assessed social anxiety with 20 items scored from 0 (*not at all characteristic or true of me*) to 4 (*extremely characteristic or true of me*), with total scores ranging from 0 to 80. The SIAS has demonstrated good internal consistency in both community and undergraduate samples and has been shown to be specific for social anxiety relative to other forms of anxiety (i.e., trait anxiety; Brown, et al., 1997). The SIAS shows good discriminant validity and can distinguish those with social anxiety from healthy controls and other anxiety disorders. SIAS scores greater than 34 are indicative of clinical levels of social anxiety (Heimberg, Mueller, Holt, Hope & Liebowitz, 1992). The SIAS assesses fears of social interaction anxiety more so than fears of being scrutinized (Mattick & Clarke, 1998). Internal consistency of the SIAS was good in the current sample (α = .87).

2.3.5 Additional Measures

The *Infrequency Scale* (IS; Chapman & Chapman, 1983) was used to identify random responders who provided random or grossly invalid responses. Four questions (e.g., "I find that I often walk with a limp, which is the result of a skydiving accident") from the IS were included. As in prior online studies (e.g., Cohen, Iglesias & Minor, 2009), individuals who endorsed three or more infrequency items were excluded from this study (n = 1).

3. Results

3.1 Participant Demographics

The sample was predominately female (75.9%) and the racial/ethnic composition was 77.5% Non-Hispanic Caucasian, 5.4% Hispanic Caucasian, 8.6% non-Hispanic African American, 0.2% Hispanic African American, 4.6% Asian American, 0.5% Native American, 2.7% multiracial, and 1.4% “other”. The mean age was 20.3 (*SD* = 2.2). Means and standard deviations of study variables are presented in Table 1. Regarding levels of social anxiety, 24% of the current sample (*n* = 103) met or exceeded the SIAS clinical cut-off score of 34, which is considered to be of clinical significance and likely to result in a diagnosis of social anxiety disorder (Mattick & Clarke, 1998). This finding is consistent with the general prevalence rates of social anxiety disorder (Kessler, et al., 2005).

3.2 Social Anxiety, Drinking variables, and PBSS Strategies

Correlations among study variables are presented in Table 1. Social anxiety was significantly positively correlated with drinking problems and peak drinks. Social anxiety was significantly negatively correlated with typical drinks, drinking frequency and PBSS Manner of Drinking. There were no significant correlations between social anxiety and PBSS Stopping/Limiting and PBSS Serious Harm Reduction subscales.

3.3 Mediation analysis

We tested whether PBSS Manner of Drinking mediated the relation of social anxiety to typical drinking, heavy drinking and alcohol-related problems using the PROCESS macro version 3.3 for SPSS (Hayes, 2017). The PROCESS macro tests mediation using an ordinary least squares regression-based model, where effects were estimated by 5,000 bootstrapped samples with a 95% confidence interval. Bootstrapped mediation (e.g., via PROCESS) are gaining preference as more robust methods of testing mediation (Hayes, 2009; MacKinnon, Fairchild & Fritz, 2007; Williams & MacKinnon, 2008). In the present analyses, estimated

standard errors and confidence intervals (95%) were calculated for the direct and indirect effects.

Three individual simple mediation analyses were conducted using social anxiety as the predictor (*X*), PBSS Manner of Drinking as the mediator (*M*), and past-month typical drinks (Y_1), peak drinks (Y_2), and alcohol problems (Y_3) as outcome variables. Drinking frequency was included as a covariate to control for weekly consumption and problems by number of drinking occasions. See Figure 1 for conceptual mediation model.

Results supported two full mediation models consistent with study hypotheses, such that PBSS Manner of Drinking was observed to mediate the relationship between social anxiety and drinking problems, as well as the social anxiety and peak drinking relation. PBSS Manner of Drinking was found to partially mediate the relationship between social anxiety and typical drinks. Estimated effects are presented in Table 2. Bootstrap estimates of indirect effects and confidence intervals are presented in Table 3.

In the absence of an observed relationship (i.e., a significant correlation) between social anxiety and PBSS Stopping/Limiting and PBSS Serious Harm Reduction subscales (see Table 1), the conditions required to test mediation were not met, i.e., that a significant relationship must exist between the predictor (x) and mediator (m) variables (Baron & Kenny, 1986).

4. Discussion

PBS use has been shown to reduce problematic drinking among student drinkers after treatment among college drinkers in general (Barnett, et al., 2007; Larimer, et al., 2007; Murphy, et al., 2012). Yet, limited research has evaluated PBS use among undergraduate drinkers with elevated social anxiety. Given that socially anxious drinkers remain vulnerable to problematic alcohol use (Schry & White, 2013), elucidation of the role of PBS use could help reduce alcohol harm and inform treatment efforts among this vulnerable group. The present study's findings elucidate social anxiety's relation with drinking and drinking-related impairment in several ways. First, we found that socially anxious drinkers underutilize PBSS Manner of Drinking, which

includes strategies such as “avoiding keeping up with others [drinking],” “avoiding drinking games,” and “avoiding pre-gaming”. These strategies may be used less frequently because they may result in social ridicule or require social interaction could be avoided. Alternatively, the individual may have difficulty employing novel social skills whilst intoxicated.

Second, our findings confirm extant findings regarding the strong relationship between social anxiety and greater alcohol problems (Buckner et al., 2013). The present data showed a negative relationship between social anxiety and typical drinks, suggesting that even among a sample of heavy-drinking university students, those with social anxiety may drink less than other students on typical drinking occasions. Equally, social anxiety was negatively correlated with drinking frequency, suggesting that socially anxious drinkers may not drink as frequently as their less socially anxious peers. However, social anxiety was positively related to peak drinking and so socially anxious drinkers might be vulnerable to drinking more heavily over fewer drinking occasions, which may explain why they report greater alcohol problems.

Third, the mediation results indicate that social anxiety was indirectly related via PBSS Manner of Drinking to peak drinking and alcohol problems such that socially anxious drinkers who use fewer PBSS Manner of Drinking techniques reported heavier drinking and more alcohol problems. PBSS Manner of Drinking was found to partially mediate the relationship between social anxiety and typical drinks, suggesting that PBSS underutilization may be more consequential during heavier drinking episodes or may simply result in heavier drinking, both of which likely contribute to greater alcohol problems. As expected, a significant relationship was not observed between social anxiety and PBSS Stopping/Limiting subscales, suggesting that social anxiety is unrelated to less socially obvious or less socially or cognitively demanding strategies (e.g., putting extra ice in your drink; not exceeding a certain number of drinks). Overall, the current study adds to a growing corpus of research showing that socially anxious students are more vulnerable to alcohol-related impairment (Schry & White, 2013). The current

findings extend knowledge by identifying underutilization of socially obvious PBS as an important factor in social anxiety's relation with drinking and related problems.

Contrary to expectation and previous findings (Villarosa, et al., 2014), the PBSS Serious Harm Reduction was unrelated to social anxiety in the current sample (see Table 1) and therefore, conditions for testing mediation were not met. One possible explanation for this discrepancy is that the PBSS-R (Madson, et al., 2013) employed by Villarosa et al. (2014) included different PBS strategies within this subscale (e.g., "avoid mixing alcohol with prescription drugs") that are not present in the PBSS-20, which may have influenced the nature of the relationship. Equally, our sample was predominately female and gender differences have been observed in drinking behavior and motivations for drinking (Holmila & Raitasalo, 2005) as well as PBS use (Lewis, Rees, Logan, Kaysen & Kilmer, 2010).

4.1 Treatment implications

Overall, the findings have important clinical implications. Brief intervention protocols such as the *Brief Alcohol Screening and Intervention for College Students* (BASICS; Dimeff, et al., 1999) typically include a personalized summary of drinking habits, psychoeducation about the nature of alcohol and its effects, and components to reduce risky drinking and related problems. Given that post-intervention PBS use mediates the efficacy of such interventions (Barnett, et al., 2007; Larimer, et al., 2007; Murphy, et al., 2012), the current findings suggest that brief alcohol intervention protocols may need to be adapted for socially anxious undergraduate drinkers to increase utilization of PBSS Manner of Drinking items, such as avoiding drinking to "keep up with others" and "avoiding pre-gaming". For example, during the feedback interview, socially anxious participants could be asked to identify challenging PBS strategies or barriers to employing PBS. Study therapists may then increase confidence for attempting PBSS Manner of Drinking items via cognitive restructuring and/or role play. Alternatively, a brief cognitive behavioral component addressing faulty cognitions about the likelihood of experiencing social ridicule when employing certain PBS strategies (e.g., drinking

game refusal) may be helpful. Equally, it will be important for future research to evaluate whether the PBS deficit exists after socially anxious drinkers receive an alcohol prevention intervention and whether those deficits are linked to continued problematic drinking.

In continuation, receiving psychotherapy for social anxiety (e.g., improving social skills, increasing coping skills, decreasing cognitive rumination) may also help socially anxious drinkers more effectively implement harm reduction strategies such as PBS in anxiety-provoking drinking settings. For example, the therapist might assist the client in role playing drink refusal or drinking game participation refusal to improve the client's confidence for implementing such strategies. It could also be helpful to manage the socially anxious client's cognitions regarding the benefits of 'pre-gaming' or drinking before the event. For example, a socially anxious drinker who believes that they cannot manage a new social situation without being under the influence of alcohol would remain vulnerable to 'pre-gaming' behavior. If the therapist can help the client manage these fears and develop new coping strategies, then alcohol use and problematic drinking may also decrease as a result.

4.2 Limitations

The results of the current study should be interpreted considering limitations that can inform future research on this important topic. First, the sample was comprised of predominantly homogenous young adults and additional work is necessary to test whether results generalize to more diverse samples of drinkers, including non-undergraduate samples. Second, we did not collect data on drinking motives and it is possible that drinking to cope or drinking to conform may also mediate or moderate the relationship between social anxiety and PBSS use. As such, this remains an area of future research. Third, the sample was predominantly female, precluding our ability to test the moderational role of gender. This limitation is important in light of prior work finding gender to moderate the relation of social anxiety to drinking variables (e.g., Norberg, Norton & Olivier, 2009) and future work testing the impact of gender on PBS use among socially anxious heavy drinkers will be an important next step. Fourth, the study was cross-sectional in

nature, limiting our ability to test causation and determine the temporal ordering of constructs. Future work could benefit from prospective (e.g., collection of use data via a daily diary method) and experimental designs. Fifth, data were based on retrospective self-report and a multi-method (e.g., biological verification of drinking) and/or multi-informant (e.g., collateral reports of social and solitary drinking) approach will be an important next step.

4.3 Conclusions

The current study provides novel data indicating that social anxiety is related to underutilization of PBSS Manner of Drinking, which mediated the relationship between social anxiety and heavy drinking and more drinking-related problems. Identifying lower use of PBSS Manner of Drinking items as a putative risk for socially anxious drinkers has important clinical implications that warrant additional investigation.

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Table 1

Intercorrelations, means, and standard deviations of social anxiety, anxiety, alcohol use, alcohol problems, and PBSS

	1	2	3	4	5	6	7	8	9
1. Social anxiety	-								
2. Drinking frequency	-.109*	-							
3. Typical drinks	-.099*	.388**	-						
4. Peak drinks	.231**	.412**	.765**	-					
5. Drinking problems	.128**	.302**	.275**	.231**	-				
6. PBSS Total	-.045	-.088	-.306**	-.323**	-.254**	-			
7. PBSS Stopping/Limiting	-.022	-.073	-.281**	-.311**	-.207**	.949**	-		
8. PBSS Manner of Drinking	-.101*	-.089	-.239**	-.246**	-.322**	.807**	.660**	-	
9. PBSS Harm Reduction	.000	-.069	-.266**	-.260**	-.115*	.777**	.663**	.420**	-
Means	25.53	2.72	5.60	8.45	4.32	47.67	3.04	3.76	2.53
(SD)	(13.83)	(1.05)	(3.62)	(4.32)	(4.38)	(9.36)	(0.74)	(0.62)	(0.85)

Note. *N* = 431. PBSS = *Protective Behavioral Strategies Survey-20 total score and subscale scores*. Social anxiety was measured with the *Social Interaction Anxiety Scale* (SIAS). Alcohol use was measured with the *Daily Drinking Questionnaire* (DDQ). Alcohol problems were measured with the *Rutgers Alcohol Problem Inventory* (RAPI). $^{**}p < .01$; $^{*}p < .05$

Table 2

Regression Coefficients, Standard Errors, and Model Summary Information for Protective Behavioral Strategies Survey *(PBSS) Manner of Drinking subscale as a Mediator of the Relationship between Social Anxiety and Drinking Outcomes (N = 431)*

		Consequent														
		M (PBSS Manner)				Y_1 (Typical Drinks)				Y_2 (Peak Drinks)				Y_3 (Alcohol Problems)		
Antecedent		Coeff.	*SE*	*p*		Coeff.	*SE*	*p*		Coeff.	*SE*	*p*		Coeff.	*SE*	*p*
X (Social Anxiety)	a	-0.005	0.002	.020	c_1'	-0.021	0.012	.065	c_2'	0.007	0.014	.611	c_3'	0.029	0.021	.163
M (PBSS Manner)		-	-	-	b_1	-1.268	0.258	<.001	b_2	-1.376	0.287	<.001	b_3	-2.089	0.311	<.001
Covariate (Frequency)		-.059	.028	.036		1.241	0.258	<.001		1.61	0.305	<.001		1.21	0.182	<.001
Constant	i_0	4.05	0.103	.012	i_1	7.531	1.179	<.001	I_2	9.89	1.139	<.001	I_3	7.828	1.424	<.001
		$R^2 = 0.020$				$R^2 = 0.199$				$R^2 = 0.214$				$R^2 = 0.202$		
		$F(2, 428) = 4.44$, $p = .012$				$F(3, 427) = 35.43$, $p < .001$				$F(3, 427) = 38.85$, $p < .001$				$F(3, 427) = 35.93$, $p < .001$		

Table 3

Bootstrap estimates, standard errors, and 95% confidence intervals for the indirect effects of social anxiety predicting past-month typical drinks, peak drinks, and alcohol problems

	Coeff.	*SE*	CI (lower)	CI (upper)	*p*
Social anxiety → PBSS Manner of Drinking → Typical drinks	-.006	.003	.001	.013	.063
Social anxiety → PBSS Manner of Drinking → Peak drinks	.007	.004	.002	.016	.003
Social anxiety → PBSS Manner of Drinking → Alcohol problems	.018	.005	.001	.021	<.001

Note. PBSS = Protective Behavioral Strategies Survey. *N* = 431.

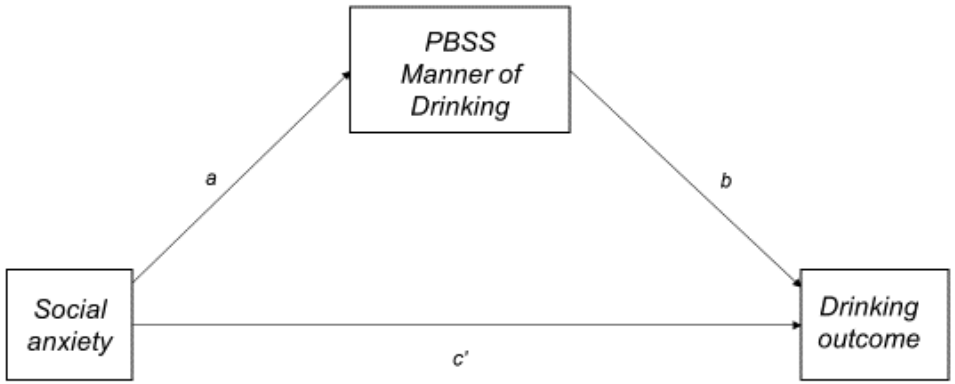

Figure 1. A statistical diagram of the *Protective Behaviors Strategies Survey* (PBSS) Manner of Drinking subscale mediation model.