

Negative Urgency and Gender Moderate the Association between Anxiety Sensitivity and Alcohol-Related Problems

Keywords: Anxiety sensitivity; Negative urgency; Alcohol use; Gender; Alcohol-related problems

Abstract

Tension reduction theory states that persons high in anxiety sensitivity (AS) are particularly sensitive to alcohol's anxiolytic effects and thus may engage in problematic drinking to reduce distress. However, the literature is mixed, suggesting a complex AS pathway to problematic drinking. Elevated AS may promote drinking to alleviate anxiety, while alcohol's initial aversive physiological effects (e.g., increased heart rate) and potentially negative outcomes may deter use among those high in AS. For anxiety sensitive persons to drink, they must temporarily disregard alcohol's negative effects and instead focus on the immediate tension-reducing effects of drinking. Accordingly, anxiety sensitive individuals, who act impulsively when anxious (i.e., *negative urgency*), may be at risk for heavy drinking and experiencing alcohol-related problems. The goal of our study was to test this prediction. Given that gender differences have been consistently documented in the alcohol use literature, we also examined gender as a secondary moderator.

Method: Undergraduates (N=346) completed self-reports of AS, negative urgency, and drinking habits.

Results: Moderation analyses revealed that AS positively predicted alcohol-related problems, but only when negative urgency was elevated and this was true for men but not for women. Counter to predictions, the effect of AS on alcohol use was not moderated by negative urgency. However, gender did moderate the AS-alcohol use association, such that AS was negatively associated with alcohol use in men, but was unrelated in women.

Conclusions: We found partial support for our hypotheses. Our findings place anxiety sensitive men, who are also high in negative urgency, at unique risk for alcohol-related problems. Clinical interventions may benefit from concurrently targeting negative urgency to reduce problematic drinking risk among anxiety sensitive men.

Introduction

Anxiety Sensitivity (AS) is an individual difference that may relate to problematic drinking risk. AS is the fear that anxiety-related bodily sensations (e.g., increased heart rate) will lead to catastrophic outcomes, such as physical illness, social embarrassment, and/or a loss of control [1,2]. Those with elevated AS experience frequent and intense anxiety symptoms and research places these individuals at risk for developing anxiety disorders (e.g., panic disorder) [3,4]. Tension reduction theory [5,6] and the stress-dampening hypothesis [7,8] predict that high levels of fear and worry increase the likelihood that a person will use alcohol to cope with these aversive states. Specifically, given that alcohol has anxiolytic effects, those with high levels of AS may be particularly inclined to drink to alleviate anxiety and dampen associated bodily symptoms [9,10]. Supporting theory,

data shows that AS is positively linked to coping-related drinking [11,12] and drinking to cope has been consistently linked with unique risk for alcohol-related problems, irrespective of level of use [13]. Some work also demonstrates that elevated AS is a premorbid risk factor for developing alcohol use disorders later in adulthood [14].

While theory predicts that those high in AS may drink alcohol to reduce anxiety, the documented associations between AS and problematic drinking (i.e., alcohol use and experiencing related problems) are mixed [15-17]. These inconsistent findings suggest that the association between AS and problematic drinking is complex. Namely, research shows that alcohol use leads to physiological changes that individuals with elevated AS should find aversive [18,19]. For example, alcohol has been shown to mimic symptoms of anxious arousal (i.e., rapid heart rate, blushing), especially in the early stages of drinking [18]. Thus, while those with elevated AS may drink to reduce anxiety, they may also avoid drinking due to finding these initial physiological effects aversive. Intoxication may also exacerbate fears related to loss of control and social embarrassment, which may further contribute to alcohol avoidance by those high in AS. Overall, the mixed literature and complexity of the AS-pathway suggests a need to examine potential moderators.

To date, there is a paucity of research examining moderators of the effect of AS on problematic drinking behavior. Two existing studies investigated the moderating roles of gender and alcohol-related motives/cognitions [20,21]. In one study, Novak and colleagues found that AS was unrelated to alcohol use for both men and women and that coping motives for drinking did not moderate the AS-alcohol use association [20]. In a second study, O'Connor et al. found that, for men only, AS was positively linked with alcohol use, but only when tension reduction alcohol expectancies were high [21]. For women, elevated AS was marginally supported as a predictor of reduced alcohol use, but only when cognitive and behavioral impairment alcohol expectancies were high. While these studies represent important steps in the AS-problematic drinking literature,



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Matthew T. Keough^{1*}, Sarah Hines¹, Amanda Winslade², and Roisin M. O'Connor¹

¹Department of Psychology, Concordia University, Montreal, Québec, Canada

²Department of Psychology, McGill University, Montreal, Québec, Canada

*Address for Correspondence

Matthew T. Keough, Department of Psychology, Concordia University, PY-239, 7141 Sherbrooke St. West, Montreal, Quebec, Canada, H4B 1R6, Tel: 514-848-2424 ext. 2390; Fax: 514-848-4523; E-mail: m_keough@live.concordia.ca

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they do not clarify from an individual difference perspective why some persons high in AS may drink alcohol to alleviate anxiety, while others may avoid heavy drinking due to fear of alcohol-related negative outcomes. This suggests the need to examine additional individual difference factors that contribute to AS-related drinking.

For those with elevated AS to drink, they must disregard (at least temporarily) the initial and delayed negative effects of alcohol use and instead focus on the more immediate anxiolytic or tension-reducing effects of drinking. Accordingly, anxiety sensitive individuals, who act impulsively when anxious, should be those at risk for heavy drinking and experiencing alcohol-related problems. The tendency to act rashly when emotionally distressed is referred to as negative urgency [22]. Individuals high in negative urgency display a decreased tolerance for negative emotions and often act in risky ways to reduce distress. With respect to the current study, we propose that negative urgency moderates the association between AS and problematic drinking. Specifically, it is those high in AS, who are also high in negative urgency, that are at particular risk for engaging in spontaneous and risky self-medication drinking. This prediction remains untested in the extant literature.

Men show higher rates of alcohol use and overall alcohol-related problems compared to women [23,24]. Also, while some studies show that women undergraduates relative to men have higher rates of AS [21,25], work by Lawyer and colleagues indicates a stronger association between AS and drinking for coping-related purposes (e.g., alleviate anxiety) among men than among women [26]. Moreover, the study by O'Connor and colleagues also demonstrated that men, who also had strong expectations of tension relief from alcohol, were the ones who drank heavily [21]. In sum, extant work identifies gender as an important moderator of the AS-related pathway to problematic drinking. Accordingly, we examined gender as an additional moderator in our study.

The goal of our study was to clarify the relation between AS and problematic drinking. We aimed to do this by testing the primary moderating role of negative urgency and the secondary moderating role of gender. Based on theory [6,8], we hypothesized that elevated AS would be associated with both increased alcohol use and alcohol-related problems but only when negative urgency was also elevated. Further, based on extant work examining gender differences [21,26], we expected that when negative urgency was elevated, there would be a stronger link between AS and problematic drinking in men compared to women. Consistent with work on coping-related drinking [13], we tested unique effects from predictors to alcohol use and related problems by controlling for the drinking variable not specified as the outcome.

Materials and Methods

Participants and procedure

Undergraduates ($N = 346$, age range 19-25 years old, 195 women) volunteers were recruited from two large universities, one in Eastern Canada ($N = 270$) and one in the North West United States ($N = 76$). Recruitment methods included advertisements via an online participant pool and via flyers posted on campus. The majority of participants were Caucasian (83%). Many students lived in a house/apartment not with family (64%), while 15% lived

at home with family; 12% lived in residence hall; and the remaining 9% lived in a fraternity/sorority or campus apartment. Forty-three percent of students reported not having a job outside of school; 49% reported working part-time and the remaining 8% worked full time. Participants completed the measures of this study as part of the baseline assessment for a larger, lab-based experimental study. Because the larger study included alcohol administration (after completion of baseline assessments), only those of legal drinking age (≥ 19 and ≥ 21 years old in Canada and USA, respectively) and who were non-abstainers (i.e., \geq one drink the past month) participated. Participants received course credit or \$10/hour as compensation. All study procedures were approved by the Health Services Research Ethics Board at Dalhousie University and by the Institutional Review Board at the University of Washington.

Measures

Anxiety Sensitivity Index [2]: The original 16-item Anxiety Sensitivity Index was used. Participants responded to items (e.g., "It scares me when my heart beats rapidly") using a 5-point scale, indicating their agreement with each item (1 = Very Little to 5 = Very Much). A sum score was calculated. In line with extant work [2], this subscale had good internal consistency in our sample ($\alpha = .85$).

Negative urgency [27]: The 12-item urgency subscale of the UPPS Impulsive Behavior Scale was used to assess distress-related impulsivity. Participants responded to items (e.g., "When I am upset, I often act without thinking") using a 5-point scale, indicating the degree to which each item described them (1 = Not at all to 5 = Extremely). A mean score was calculated. As in previous work [27,28] the internal consistency of this subscale was good in our sample ($\alpha = 0.86$).

Young Adult Alcohol Consequences Questionnaire (YAACQ) [29]: The YAACQ is a 48-item self-report measure of alcohol-related problems. Participants indicated whether or not they experienced each alcohol-related problem in the past year (1 = yes; 0 = no). Yes responses were summed to provide a total score. Consistent with previous work [30] using tetrachoric correlations, the internal consistency of the YAACQ was excellent in our sample ($\alpha = 0.95$).

Alcohol consumption [31,32]: Participants indicated their past month typical frequency (0 = not at all in the past 30 days to 7 = every day of the week) and quantity (0 = did not drink at all in the past 30 days to 10 = ten drinks per occasion) of alcohol use. Consistent with previous work [33,34], responses were multiplied to yield a composite indicating total weekly alcohol use.

Results

Data analytic overview

Data were screened prior to analyses [35]. There were no missing data and outliers on all variables were replaced with the highest acceptable observation within the $\pm 3SD$ range (4 outliers on alcohol use, 1 outlier on alcohol-related problems; $<1\%$ of data). Next, descriptive statistics and correlations were examined followed by multiple regression analyses to test negative urgency and gender as moderators of the association between AS and problematic drinking. Continuous predictors (AS and negative urgency) were centered prior to creating interaction terms to reduce multicollinearity.

Gender was initially coded as women = 0 and men = 1. Statistically supported interaction terms were probed using simple slopes analysis. Consistent with recommendations by Aiken and West (1991) [36], the model was conditioned on high (+1SD above the mean) and low (-1SD above the mean) levels of negative urgency and levels of gender.

Descriptive statistics and correlations

Correlations and descriptive statistics for all variables are presented in Table 1. Relative to extant work on North American drinkers, our sample had comparable mean levels of alcohol use and alcohol-related problems [29,37]. Consistent with some work [38], AS was positively correlated with alcohol-related problems, but not with alcohol use. As expected, negative urgency was positively correlated with both alcohol use and alcohol-related problems. Also, in line with previous work [23,24] and predictions, men consumed more alcohol and experienced more alcohol-related problems than women.

Hypothesis testing

Two separate regression models were used to test hypotheses. In model one, alcohol use (criterion variable) was regressed on the first order effects of AS, negative urgency, and gender, all two-way interactions, and the three way interaction of interest. The alcohol-

related problems variable was included as a covariate. This model accounted for approximately 31% of the variance in alcohol use. As seen in Table 2, the AS × Negative Urgency × Gender interaction term was not statistically significant, but statistically significant two-way interaction terms were observed (AS × Gender and Negative Urgency × Gender). Simple slopes analyses of these two-way interactions revealed that AS was a statistically significant negative predictor of alcohol use for men ($B = -0.21, t_{(337)} = -3.64, p < 0.001, f^2 = 0.05$), but not for women ($B = -0.04, t_{(337)} = -0.89, p = 0.38, f^2 < 0.001$). Also, negative urgency was a statistically significant positive predictor of alcohol use for men ($B = 1.66, t_{(337)} = 2.07, p = 0.04, f^2 = 0.02$) but not for women ($B = -0.90, t_{(337)} = -1.43, p = .15, f^2 < 0.001$).

In model two, alcohol-related problems (criterion variable) was regressed on the first order effects of AS, negative urgency, and gender, all two-way interactions, and the three way interaction of interest. The alcohol use variable was included as a covariate. This model accounted for 42% of the variance in alcohol-related problems. The three-way AS × Negative Urgency × Gender interaction term received marginal statistical support ($p < 0.10$) (see Table 2). The three-way interaction term was probed by at high and low levels of negative urgency and by gender. We observed a statistically significant two-way AS × Negative

Table 1: Descriptive statistics and correlations.

	1	2	3	4	5
1. Anxiety Sensitivity	1.00	0.35**	0.00	- 0.05	0.23**
2. Negative Urgency		1.00	0.06	0.16**	0.46**
3. Gender (0=women, 1=men)			1.00	0.29**	0.16**
4. Alcohol Use				1.00	0.45**
5. Alcohol-Related Problems					1.00
<i>M</i>	35.57	2.53	-	8.47	11.91
<i>SD</i>	9.55	0.71	-	6.69	7.92

Note: * $p < .05$ ** $p < .001$

Table 2: Testing negative urgency and gender as moderators of the effect of anxiety sensitivity on problematic drinking outcomes.

Predictors	B	SE	β	R ²	t	p
Alcohol Use (criterion)						
Alcohol-Related Problems	0.38	0.05	0.46		8.54	0.00
Anxiety Sensitivity	-0.04	0.04	-0.06		-0.89	0.38
Negative Urgency	-0.90	0.63	-0.10		-1.43	0.15
Gender (women = 0, men = 1)	3.32	0.67	0.25		4.94	0.00
Anxiety Sensitivity X Negative Urgency	-0.02	0.05	-0.02		-0.32	0.75
Anxiety Sensitivity X Gender	-0.17	0.07	-0.15		-2.32	0.02
Negative Urgency X Gender	2.56	0.96	0.17		2.66	0.01
Anxiety Sensitivity X Negative Urgency X Gender	-0.13	0.10	-0.08		-1.34	0.18
				.31 [.23-.39] ^a		
Alcohol-Related Problems (criterion)						
Alcohol Use	0.47	0.06	0.40		8.54	0.00
Anxiety Sensitivity	0.04	0.05	0.05		0.85	0.40
Negative Urgency	4.24	0.66	0.39		6.43	0.00
Gender (women = 0, men = 1)	0.40	0.77	0.03		0.52	0.61
Anxiety Sensitivity X Negative Urgency	0.03	0.06	0.03		0.57	0.57
Anxiety Sensitivity X Gender	0.10	0.08	0.08		1.31	0.19
Negative Urgency X Gender	-0.15	1.08	-0.01		-0.14	0.88
Anxiety Sensitivity X Negative Urgency X Gender	0.20	0.11	0.10		1.87	0.06
				.40 [.32-.48] ^a		

Note: ^a95% confidence interval

Urgency interaction term when the model was conditioned on men ($B = 0.24$ [$SE = 0.09$], $b = 0.31$, $p = 0.01$) but not women ($B = 0.03$ [$SE = 0.06$], $b = 0.04$, $p = 0.57$) gender. Further, as expected, we found that AS was positively associated with alcohol-related problems at high ($B = 0.32$, $t_{(337)} = 3.68$, $p = 0.00$, $f^2 = 0.04$), but not at low ($B = -0.02$, $t_{(337)} = -0.24$, $p = 0.81$, $f^2 = 0.00$), levels of negative urgency in men (see Figure 1). This effect was not supported in women.

Discussion

The primary goal of our study was to clarify the link between AS and problematic drinking. We aimed to accomplish this by testing negative urgency and gender as moderators of the AS-problematic drinking association. Our results partially supported our hypotheses. As expected, we found that elevated AS was associated with increased alcohol-related problems, but only when negative urgency was elevated and this effect was present in men but not in women. Unexpectedly, negative urgency did not moderate the effect of AS on alcohol use, while gender did. Specifically, contrary to prediction, AS was related to reduced levels of alcohol use in men, however, not unexpectedly, AS was unrelated to drinking in women. Also, consistent with previous work on impulsivity and alcohol use [39,40], elevated negative urgency predicted increased drinking in men, but not in women.

One important finding from this study was that elevated negative urgency increased risk for alcohol-related problems among men who were relatively high in AS. Due to high negative urgency, the immediate anxiolytic effects of alcohol use should be salient to those who are high in AS, which may cause individuals to engage in risky and

disinhibited behaviour (e.g., problematic drinking). While our study aligns with this interpretation, a specific test of alcohol expectancies in this risk model is warranted. Our finding that concurrently high AS and negative urgency is a risk factor for alcohol-related problems for men only fits well with extant findings. Not only are men found to have higher rates of impulsivity relative to women [41] but also impulsivity is found to be a more central influence of problematic drinking for men compared to women [23]. Moreover, a number of studies show that men are at increased risk relative to women for coping- and anxiety-related drinking [21,26,42,43]. Our findings bring these literatures together, suggesting that elevated negative urgency may in part help us understand these gender effects we see in the anxiety-drinking risk pathway.

Counter to predictions, we did not find support for the moderating role of negative urgency on the AS-alcohol use association and unexpectedly elevated AS predicted decreased alcohol use in men. A review of the negative reinforcement-motivated drinking literature indicates that these results are not that surprising. Much of the evidence demonstrates that drinking to alleviate negative affect increases specific risk for alcohol-related problems, irrespective of use [13]. Moreover, the link between coping-related drinking and levels of alcohol use is highly mixed in young adults [44-47]. Without considering gender, we found a null zero-order correlation between AS and typical weekly alcohol use, supporting the commonly reported notion that the link between negative affect and alcohol use is not straightforward [48].

O'Connor and colleagues found that AS was positively related to alcohol use in men but *only* if they had high tension-reduction

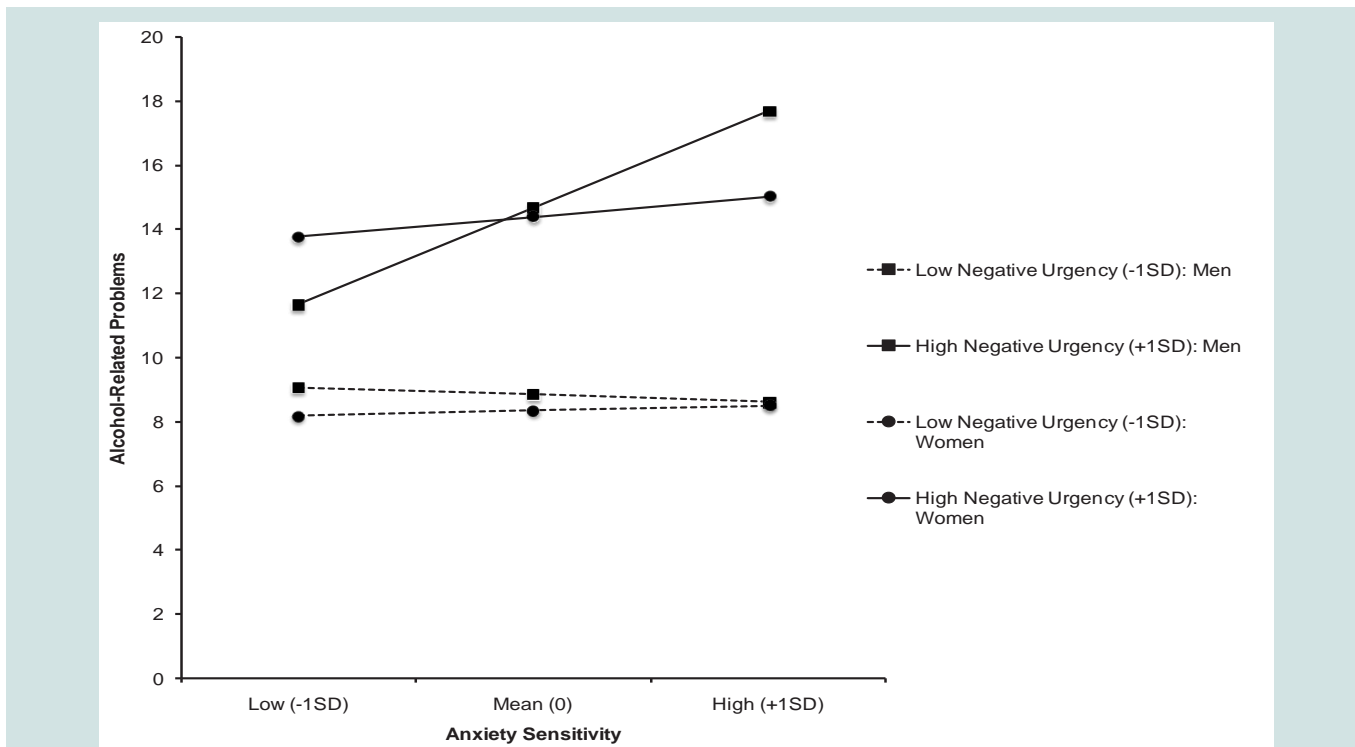


Figure 1: Simple slope for anxiety sensitivity at high and low levels of negative urgency for men (n = 151) and women (n = 195). Alcohol use was entered as a covariate.

expectancies [21]. Accordingly, it could be that the theoretically proposed positive link between AS and alcohol use may depend on additional factors not considered in the present study. To illustrate, theory predicts that heavy drinking among those high in AS should be most reinforcing in contexts where anxious affect is elevated [10]. Supporting this, persons with elevated AS have been shown to drink heavily specifically when negative emotionality is high (e.g., conflict with others) [49] and this relation is stronger for men than for women [26]. We did not consider context-specific use in our models, instead, it is possible that our global measure of weekly alcohol use did not tap heavy drinking of interest – that is, heavy drinking among those high in AS when they are anxious. This may account for why our effects differ from those reported in other studies (e.g., [49]). It would be beneficial for future studies to examine how the interaction between AS and negative urgency plays out in men to predict alcohol use in contexts where emotional distress is high. Our results also indicate that men are likely to drink more (relative to women) if they also have elevated negative urgency. This result aligns with the broad literature on impulsivity and alcohol use (see Dick et al. [50] for a recent review) and suggests that men may be inclined to engage in risky in-the-moment alcohol use due to their intolerance of emotional distress.

Overall, our results indicate that AS is a complex predictor of drinking in men, but may be less relevant to women's drinking. These results are consistent with numerous studies supporting gender differences in anxiety-related drinking. The clinical literature suggests that men (vs. women) with Panic Disorder are more likely to report drinking for coping reasons [51] and in turn, this type of drinking has been firmly linked with risk for alcohol-related problems (see Kuntsche et al. [13] for a review). While we examined risk at the sub-clinical level of any anxiety disorder, our finding with respect to alcohol-related problems is consistent with this literature. Despite this, the null association between AS and drinking for women was surprising because there is a documented high co-morbidity of anxiety disorders and alcohol use disorders in later adulthood among women [52,53]. Our null findings in women may reflect gender differences in coping styles at the young adulthood stage of development. While the coping literature is complex, some work indicates that women are more likely than men to seek social and emotional support [54], whereas, men tend to use avoidant coping strategies (e.g., alcohol use) [55]. The social nature of university may offer much needed support for anxiety sensitive women – mitigating the need to use alcohol to cope. Anxiety sensitive women may experience a drop-off in social support resources when transitioning out of university, which may cause them to adopt other coping strategies, like alcohol use. Informed by developmental theories of alcohol use risk [56,57], we speculate that alcohol use as a primary coping strategy may unfold over adulthood in anxiety sensitive women. Future work should clarify this by continuing to examine gender-specific etiological models as anxiety sensitive persons – who are also high in negative urgency – move through adulthood.

Our results may help inform clinical intervention and prevention efforts for reducing problematic drinking among those with elevated AS. Evidence-based treatments, such as Cognitive-Behaviour Therapy (CBT [58]) and/or personality-matched interventions [59,60], have been shown to be useful for reducing both AS symptoms, as well as concurrent alcohol use problems. The main rationale behind these

treatments is to target AS symptoms using cognitive and behavioral strategies (e.g., psychoeducation, interoceptive exposure) and thus allow individuals to become tolerant of anxiety symptoms [58,61,62]. Our results suggest that it may be additionally beneficial to target factors like distress tolerance and behavioural disinhibition to reduce risk for alcohol use and related problems among anxiety sensitive men. This may help slow down the impulsivity of risky distress-related drinking among these individuals.

There are some notable limitations of this study. First, this study is cross-sectional and we are limited in making assertions about causality. Learning processes (e.g., alcohol expectancies, drinking motives), which unfold over time and through experience, may be important explanatory factors that underlie drinking among those high in AS and high in negative urgency. However, this remains to be explicitly tested in future experimental and longitudinal work. Second, given our quasi-experimental design, we were unable to capture – *in the moment* – the distress-related shift into impulsive behaviour that is believed to effect problematic drinking in persons high in AS and negative urgency. Accordingly, future work should expand on our models by using experimental methods to assess this shift (anxious mood induction coupled with measurement of impulsivity) and its subsequent impact on in-lab drinking among those high in AS. Finally, we used the original Anxiety Sensitivity Index [2], which captures mainly physiological aspects of AS. Updated work and measures (i.e., the Anxiety Sensitivity Index-3 [63]) indicate that AS is multifaceted and includes physiological, cognitive, and social features. For example, social AS is characterized by fears that publically observable anxiety symptoms will lead to social rejection and ridicule from peers [63] and this may be particularly concerning in university settings where normative drinking is at social events [64]. Possibly, elevated negative urgency may draw attention to the positive social aspects of drinking (e.g., social affiliation, being included by peers) among those high in social AS. Consistent with studies on drinking norms (e.g., [65]), this may lead those high in social AS and negative urgency to overestimate the drinking of their peers, which may increase their own risk for drinking heavily and experiencing related problems. It would be interesting for future studies to examine this possibility – with a continued focus on also understanding gender-specific risk.

In conclusion, the main strength of our study is that we are among the first to examine negative urgency and gender as theoretically relevant moderators of the AS-problematic drinking association. Results indicated that AS is a complex risk factor for drinking behaviour among men, but not among women in our sample. These findings provide insight into contributing factors underlying AS-related drinking and serve to provide a strong foundation for future empirical testing.

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