Decomposing the Relationship Between Anxiety Sensitivity and Alcohol Use

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ABSTRACT. Objective: The misuse of alcohol is related to numerous detrimental health effects. Research has determined anxiety sensitivity (AS) to be a risk factor for problematic alcohol use. To date, no studies have investigated this relationship using a bifactor model of AS. This study used a bifactor model to determine the effects of the general AS factor and the cognitive, physical, and social concerns subfactors on alcohol-related outcomes. **Method:** The sample consisted of 329 participants selected from a larger sample of individuals in a brief smoking-cessation intervention. Latent factor models were used to determine the effects of the bifactor model of AS on alcohol use behavior. **Results:** The

general AS factor was significantly associated with alcohol use problems but not alcohol consumption. The AS subfactors of cognitive, physical, and social concerns were not significantly related to either alcohol variable. **Conclusions:** The findings are inconsistent with previous research that has found associations between the AS subfactors and alcohol-related outcomes. The use of a bifactor model of AS allowed the variance associated with AS to be parceled out of the subfactors, indicating that general AS accounts for the relationship between AS and alcohol misuse. (*J. Stud. Alcohol Drugs*, 76, 957–961, 2015)

BETWEEN 2006 AND 2010, excessive alcohol use led to approximately 88,000 U.S. deaths and 2.5 million years of potential life lost, annually (Centers for Disease Control and Prevention, 2013; Stahre et al., 2014). One risk factor associated with alcohol use and misuse is anxiety sensitivity (AS), or the fear of anxiety-related sensations (Reiss & McNally, 1985). Studies have found evidence for a higher-order factor structure of AS comprising three lower-order factors: cognitive concerns (fear of cognitive dyscontrol), physical concerns (fear of physical sensations), and social concerns (fear of observable symptoms; Zinbarg et al., 1997). A bifactor model of AS was recently validated that allows researchers to clearly examine relations that the general and specific dimensions of AS share with other constructs (Allan et al., 2015; Ebesutani et al., 2014; Osman et al., 2010). The bifactor model of AS represents the common variance related to a single general factor (e.g., AS) as well as the variance unique to items related to orthogonal subfactors (e.g., cognitive, physical, and social concerns). As such, the bifactor model improves on the hierarchical model by allowing for the use of both the general AS factor and the AS subfactors

as independent variables. Modeling AS in this way allows researchers to determine whether AS is unidimensional or multidimensional and can inform clinical decisions to target general AS or the specific subdimensions in the treatment of alcohol misuse. To date, no studies have investigated the relationship between AS and alcohol use using the bifactor structure of AS.

Research investigating the relationship between AS and alcohol use has focused on the higher-order construct of AS. In general, AS predicts excessive alcohol consumption (Stewart et al., 1995, 2001) and alcohol use problems (Howell et al., 2010), and prospectively predicts the development of alcohol use disorders (Schmidt et al., 2007). However, a recent study highlighted the need to account for depression in the relationship between AS and alcohol use problems. Specifically, Lechner and colleagues (2014) determined that depression symptoms mediated the relationship between AS and alcohol use problems.

Less is known about how the specific subfactors of AS relate to alcohol use and misuse. One study found that AS social concerns uniquely predicted frequency and excessiveness of alcohol use (Stewart et al., 2001). Other studies have identified AS cognitive concerns as most robustly related to alcohol use (Harwell et al., 2011; Koven et al., 2005; Stewart et al., 2001). However, several limitations complicate the interpretation of results from these studies. First, data for each study were collected in undergraduate samples and have not yet been replicated in a more representative community sample. Additionally, AS was measured in each of these studies using the original Anxiety Sensitivity Index (ASI; Reiss et al., 1986) and not the more psychometrically

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sound ASI-3 (Taylor et al., 2007). Importantly, none of these studies used a bifactor model of AS, making it more difficult to identify the unique contributions of general AS and AS subfactors on alcohol use and misuse.

The current study was designed to investigate the effects of the general and specific AS factors on alcohol consumption and problematic alcohol use. Based on prior studies (Allan et al., 2015; Schmidt et al., 2007; Stewart et al., 1995, 1997, 2001), it was expected that general AS would be positively associated with alcohol consumption and problematic alcohol use. In addition, based on studies conducted by Harwell and colleagues (2011) and Koven and colleagues (2005), it was hypothesized that AS cognitive concerns would be associated with increased alcohol consumption and problematic alcohol use. As one study found that AS social concerns were related to alcohol use and severity of alcohol problems (Stewart et al., 2001), it was expected that AS social concerns would also be associated with increased alcohol consumption and problematic alcohol use. Finally, as it has been suggested that AS physical concerns do not capture any unique aspect of AS above and beyond general AS (Allan et al., 2015), it was hypothesized that no relations would be found between AS physical concerns and alcohol-related outcomes.

Method

Participants

The current sample consisted of 329 adults, ages 18–65 years ($M = 35.95$, $SD = 13.62$), who were selected from a larger community sample based on their endorsement of at least monthly alcohol use (Capron et al., 2014). Participants were recruited based on elevated AS and a report of smoking at least eight cigarettes daily for at least 1 year for a randomized controlled trial investigating the effects of a brief smoking-cessation intervention. Individuals who used another smoking-cessation or tobacco product or had a psychotic spectrum disorder, significant medical condition, or severe suicidality that warranted immediate attention were excluded. In the current sample, gender was evenly distributed (48.9% female). The racial/ethnic breakdown of the sample was as follows: 86.0% White, 7.0% Black/non-Hispanic, 3.3% Hispanic, 1.2% Asian, 0.3% Black/Hispanic, and 2.1% other (e.g., biracial).

Procedure

Participants were recruited at two sites (University of Vermont, Burlington, VT, and Florida State University, Tallahassee, FL) at which identical procedures were implemented. Data used for the present investigation were collected during a baseline assessment of self-report measures before intervention. The current study was approved by the university's

internal review board, and informed consent was obtained from all participants before data collection.

Measures

Alcohol Use Disorders Identification Test (AUDIT). The AUDIT (Saunders et al., 1993) is a questionnaire that assesses the severity of alcohol use problems. In the current study, a two-factor model comprising Consumption and Dependence/Harmful Alcohol Use factors was used, each of which demonstrated adequate internal consistency in the current sample ($\alpha = .78$ and $.80$, respectively; Maisto et al., 2000).

Anxiety Sensitivity Index–3. The ASI-3 (Taylor et al., 2007) was adapted from the ASI (Reiss et al., 1986) to improve the psychometrics of the three AS subfactors: cognitive concerns, physical concerns, and social concerns. In the current study, the ASI-3 total score and each subscale demonstrated good to excellent internal consistency ($\alpha = .83$ – $.92$).

Beck Depression Inventory–II (BDI-II). The BDI-II (Beck et al., 1996) is a self-report questionnaire used to assess depressive symptomatology. In the current study, the BDI-II demonstrated excellent internal consistency ($\alpha = .93$).

Data analytic plan

Confirmatory factor analysis (CFA) was conducted to examine the factor structure of the ASI-3, comparing a three-factor correlated factors model (i.e., AS physical, cognitive, and social concerns factors) to a bifactor model (i.e., orthogonal AS general, AS physical concerns, AS cognitive concerns, and AS social concerns factors) as there are only three published studies comparing these models (i.e., Allan et al., 2015; Ebesutani et al., 2014; Osman et al., 2010). CFA models were also fit to the AUDIT to determine whether the two- (Alcohol Consumption and Dependence/Harmful Alcohol Use) or three-factor (Alcohol Consumption, Alcohol Dependence, and Harmful Alcohol Use) model fit the data best. All data were analyzed using robust weighted least squares (WLSMV), treating item-level data as categorical, in Mplus Version 7.1 (Muthén & Muthén, 1998–2012). Models were scaled by setting factor variances to one. Overall model fit was assessed using the likelihood ratio test, based on the chi-square value. A nonsignificant likelihood ratio test indicated good model fit. However, because the chi-square test rejects even adequately fitting models, especially with larger sample sizes and many items per factor (Hu & Bentler, 1999; Marsh, 2007; Moshagen, 2012; Mulaik, 2007), fit indices based on the chi-square distribution were also used to assess model fit. Agreement among fit indices was seen as providing evidence that at least adequate model fit was achieved. The comparative fit index (CFI; Bentler, 1990), Tucker–Lewis index (TLI; Tucker & Lewis, 1973), and the root mean square error of

TABLE 1. Structural equation model parameters for the associations that anxiety sensitivity (AS) and covariates share with alcohol consumption and problems

Variable	Alcohol consumption			Dependence/ harmful alcohol use		
	<i>B</i>	<i>SE</i>	β	<i>B</i>	<i>SE</i>	β
AS general	0.24 [†]	0.14	.18	0.44***	0.13	.36
AS physical	-0.22	0.17	-.16	-0.05	0.13	-.04
AS cognitive	-0.55	0.34	-.40	-0.24	0.23	-.04
AS social	-0.32 [†]	0.19	-.23	-0.27	0.15	-.19
Gender	-0.54**	0.18	-.20	-0.24	0.16	-.10
Age	-0.04***	0.01	-.36	-0.02***	0.01	-.24
Depression	0.02	0.02	.14	0.01	0.01	.10

[†] $p < .10$; ** $p < .01$; *** $p < .001$.

approximation (RMSEA; Steiger, 1990) with accompanying 90% confidence intervals (CIs) were examined. CFI and TLI values greater than .90 and RMSEA values below .08 indicated adequate model fit. CFI values greater than .95 and RMSEA values below .05 indicated good model fit. Finally, if the lower bound 90% CI was below .05, good fit could not be ruled out, and if the upper bound 90% CI was greater than .10, poor fit could not be ruled out (Brown, 2006; Browne & Cudeck, 1992; MacCallum et al., 1996; Yu, 2002).

Additionally, because the bifactor ASI-3 model is nested in the correlated factors ASI-3 model and the three-factor AUDIT model is nested in the two-factor AUDIT model, the DIFFTEST was used in Mplus to compare nested models. If the models did not significantly differ, the more parsimonious model (i.e., the correlated factors ASI-3 model and the two-factor AUDIT model) was accepted. Once the best-fitting CFA models were determined, a structural equation model was conducted including the ASI-3 factors, with depression (i.e., the BDI-II, treated as a manifest variable), gender, and age, predicting the AUDIT factors being controlled for.

Results

Descriptive statistics and correlations

Examination of missing data revealed little missing data at the item level. One participant did not have data for one of the control variables, the BDI-II. No other participants were missing data at the item level. Means, standard deviations, and correlations for all study variables are available on request.

Confirmatory factor analysis models for anxiety sensitivity and alcohol problems

For the ASI-3, the bifactor model comprising an AS general factor and orthogonal AS physical, cognitive, and social concerns factors provided good fit to the data, $\chi^2(117) =$

161.79, CFI = .99, TLI = .99, RMSEA = .03, 90% CI [.02, .05], and demonstrated improved model fit as compared with the correlated factors model ($\Delta\chi^2 = 81.11$, $\Delta df = 15$, $p < .001$). For the AUDIT, the two-factor model comprising alcohol consumption and dependence/harmful alcohol use factors provided adequate fit to the data, $\chi^2(34) = 71.43$, CFI = .99, TLI = .99, RMSEA = .06, 90% CI [.04, .08]. Further, model fit was not improved in the three-factor model of the AUDIT ($\Delta\chi^2 = 1.95$, $\Delta df = 2$, $p > .05$).

Structural equation model examining the effects of anxiety sensitivity and control variables on alcohol problems

The structural equation model including the general AS factor as well as the specific AS factors predicting the alcohol problems factors (i.e., alcohol consumption and dependence/harmful alcohol use), controlling for depression (as measured by the BDI-II), gender, and age, provided good fit to the data, $\chi^2(399) = 541.47$, CFI = .99, TLI = .98, RMSEA = .03, 90% CI [.03, .04]. Table 1 contains the parameter estimates for the associations between the AS factors (and covariates) and the alcohol factors. The AS general factor was marginally significantly associated with the alcohol consumption factor ($\beta = .18$, $p < .10$) and significantly associated with the dependence/harmful alcohol use factor ($\beta = .36$, $p < .001$). The AS factors and control variables accounted for 45.5% of the variance in the alcohol consumption factor and 31.7% of the variance in the dependence/harmful alcohol use factor.

Discussion

This study investigated the unique effects of the general AS factor and the AS subfactors on alcohol use and misuse. As hypothesized, and consistent with previous work (Allan et al., 2015; Schmidt et al., 2007; Stewart et al., 1995, 1997, 2001), general AS was significantly related to increased problematic alcohol use, when we controlled for age, gender, and depression. No significant association was found between general AS and alcohol consumption.

The current study also examined the unique effects of the AS subfactors (cognitive, social, and physical concerns), after accounting for the variance associated with general AS, on alcohol use and misuse. As expected, physical concerns were not related to any of the alcohol-related variables. Unexpectedly, neither social nor cognitive concerns were related to problematic alcohol use or consumption. Despite previous studies reporting such relationships (Harwell et al., 2011; Koven et al., 2005; Stewart et al., 2001), the current study found only general AS to be associated with alcohol misuse. The findings appear to be in contrast with theories which posit that individuals drink specifically to reduce publicly observable symptoms of anxiety (Stewart et al., 2001) or to decrease the anxiety associated with the feeling of cognitive dyscontrol (Harwell et al., 2011). Instead, it appears that fearing anxiety more broadly may be related to an individual's propensity to drink problematically.

The findings of the current study have important implications. First, the results indicate that individuals with elevated AS do not necessarily consume more alcohol, but they experience increased problems because of their alcohol use. Second, AS can be reduced through targeted interventions (Schmidt et al., 2007, 2014; Smits et al., 2008); furthermore, reductions in AS appear to decrease problematic drinking (Conrod et al., 2006; Watt et al., 2006). Although prior work has suggested a role of specific AS subfactors in alcohol problems (Harwell et al., 2011; Koven et al., 2005; Stewart et al., 2001), the current study indicates that general AS is the sole factor associated with problematic alcohol use. The findings suggest that tailoring exposure treatments to target physical, social, or cognitive concerns in the treatment of problematic alcohol use may be unnecessary, and targeting AS in general may be more beneficial. Because AS has been shown to be a transdiagnostic risk factor for both anxiety disorders and substance use disorders (Naragon-Gainey, 2010; Schmidt et al., 2006, 2007), the targeting of AS may be an ideal starting point for clinicians treating individuals with anxiety and alcohol problems.

It is important to note the limitations of the current study. First, each construct used in this study was measured by self-report instruments. Future studies should consider using multi-method approaches to confirm these findings. Second, this study used a sample of individuals who were seeking treatment to stop smoking cigarettes, and, therefore, the results may not generalize to individuals who drink but do not smoke cigarettes. Future studies should seek to replicate these findings in a broader sample—specifically, a sample that is not composed exclusively of cigarette smokers. Finally, the use of a cross-sectional design precluded the determination of causality. A longitudinal design would allow researchers to determine whether general AS precedes and causes alcohol problems.

The current study was the first to use a bifactor model of AS in an attempt to determine the unique contribution of

general AS and the AS subfactors on alcohol use and misuse. The results show that although general AS may not be associated with increased alcohol consumption, it is associated with increased alcohol-related difficulties. Furthermore, this study indicates that the AS subfactors provide no unique contribution to these alcohol-related outcomes. Overall, this study highlights general AS as a factor that can contribute to problematic alcohol use.

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