



# The mediating role of depression in the relationship between anxiety sensitivity and alcohol dependence



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## HIGHLIGHTS

- Effects of AS on Alc were mediated by depression.
- Specifically, AS Total and Somatic were mediated by depression.
- Dual mediation: depression & problematic coping uniquely mediate.

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## ABSTRACT

**Background:** Many studies have reported that Anxiety Sensitivity (AS) is positively associated with alcohol use or other alcohol-related variables. More recent mediator and moderator models have shown promise in elucidating mechanisms within this relationship; the literature to date suggests that the relationship between AS and alcohol is likely mediated by problematic coping motives. However, few studies have considered the effects of depression within the AS–alcohol use relationship, despite a strong body of evidence linking AS to subsequent depression and depression to subsequent alcohol use problems, independently. Therefore, the current study assessed depression as a potential mediator of this relationship.

**Method:** Participants were 418 sequential admissions to a substance abuse treatment facility. A mediation analysis using bootstrapping was utilized in order to estimate indirect effects of AS on alcohol dependence through depression.

**Results:** Results reveal an indirect effect suggesting that the effects of anxiety sensitivity on alcohol dependence are mediated by symptoms of depression. More specifically, the effects of AS total score and AS somatic sensations on alcohol dependence were mediated by symptoms of depression. Lastly, a dual mediator model demonstrated that both depression and problematic coping uniquely mediate the relationship between AS and alcohol dependence.

**Conclusions:** While preliminary in nature, the current study provides evidence supporting the hypothesis that depression is an important factor to consider when examining the relationship between AS and alcohol dependence.

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## 1. Introduction

A robust body of work has examined the relationship between anxiety sensitivity (AS) and problematic alcohol use in the past 20 years (see DeMartini & Carey, 2011 for a review). AS has been described as the fear of anxiety sensations (e.g., Reiss, Peterson, Gursky, & McNally, 1986) and has been linked to increased incidence of alcohol use disorders (Schmidt, Buckner, & Keough, 2007), increased alcohol

consumption (Stewart, Peterson, & Pihl, 1995; Stewart and Zeitlin, 1995), and increased motivation to drink to cope (Conrod, Pihl, & Vassileva, 1998; Stewart, Karp, Pihl, & Peterson, 1997). Studies controlling for symptoms of state and trait anxiety have demonstrated that the relationship between AS and problematic alcohol use is not simply attributable to increased symptoms of anxiety alone (DeHaas, Calamari, & Bair, 2002; DeHaas, Calamari, Bair, & Martin, 2001). Thus, AS appears to be a unique and problematic predictor of alcohol use.

More recently, studies have examined mediator and moderator models in order to elucidate mechanisms within this relationship. Stewart, Zvolensky, and Eifert (2001) found that negative reinforcement based coping motives mediated the relationship between AS

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and alcohol consumption, and noted that gender may differentially affect the type of negative reinforcement based coping utilized. Whereas several studies have identified coping motives as an important variable within this relationship (DeMartini & Carey, 2011; Stewart et al., 2001), the moderating role of gender was not replicated in a subsequent study (Novak, Burgess, Clark, Zvolensky, & Brown, 2003). Taken together, the literature to date indicates that the relationship between AS and problematic alcohol use is likely mediated by coping motives and also suggests that gender may be an important variable to account for.

While several studies have identified the role of coping motives within this relationship, few have considered the role of depression despite strong evidence linking AS to subsequent depression (Grant, Beck, & Davila, 2007; Muris, Schmidt, Merckelbach, & Schouten, 2001; Zavoos, Rijdsdijk, & Eley, 2012) and depression to subsequent alcohol use problems (e.g. Gilman & Abraham, 2001; Hartka et al., 1991), independently. While further research is needed to understand the mechanisms linking AS and depression, it has been posited that problematic cognitive styles common in individuals with high AS, such as rumination, may lead to depression (Zavoos et al., 2012). Similarly, research regarding the link between depression and later problematic alcohol use is continually progressing; to date this link has been attributed to several potential mechanisms including negative reinforcement, increased reward sensitivity, and increased cognitive dyscontrol (Abraham & Fava, 1999; Christie et al., 1988). Taken together, independent studies have found causal relationships between AS and subsequent depression, and depression and subsequent alcohol use. Thus, there is a clear rationale for including depression into a model examining the relationship between AS and problematic alcohol use. It may be that a propensity for problematic coping is not the only pathway or the most important pathway to focus on when considering the link between AS and alcohol use. It is possible that the onset of depression following symptoms of AS may be equally or more important in predicting subsequent alcohol problems.

Despite the aforementioned research, relatively little attention has been given to depression within the specific field of literature examining the AS–alcohol use relationship. Two studies have considered the role of negative affect, a construct related to but not equivalent to depression, within the AS–alcohol use relationship (Howell, Leyro, Hogan, Buckner, & Zvolensky, 2010; Zack, Poulous, Fragopoulous, & MacLeod, 2003; Saunders, Aasland, Babor, de la Fuente, & Grant, 1993). One study found that primed negative affect resulted in greater alcohol consumption, regardless of participant AS levels (Saunders et al., 1993; Zack et al., 2003). A second study found that the association between AS and alcohol use remained even after controlling for levels of negative affect as measured by the PANAS (Howell et al., 2010). In sum, these studies yield mixed results regarding the role of negative affect within the relationship between AS and alcohol. Moreover, these studies examine a construct related to, but not commensurate with depression.

Therefore, the current study proposes to examine the role of symptoms of depression assessed with a widely used and psychometrically valid measure of depression. Given the evidence demonstrating that AS can lead to subsequent depression and that depression can lead to subsequent alcohol use problems, we believe a model examining symptoms of depression as a mediator within the AS–problematic alcohol use relationship could provide a meaningful extension to the current literature. Additionally, previous studies have demonstrated the importance of including negative-reinforcement-based coping into a model examining this relationship (Conrod et al., 1998; Stewart et al., 1997). Therefore, the current study conducted additional analyses examining depression and problematic coping as dual-mediators to determine if depression uniquely mediates this relationship, above and beyond the known mediating role of problematic coping. Additionally, alcohol dependence was selected as the primary outcome variable for its ability to capture impairment and dysfunction above and beyond other measures of alcohol consumption such as frequency or amount of drinks consumed.

Lastly, we explored the specific indirect effects of three lower order factors of AS, including fear of somatic sensations, fear of cognitive dyscontrol, and fear of socially observable anxiety symptoms (see Zinbarg, Molman, & Hong, 1999 for review) as they relate to alcohol use. These three sub-factors are hierarchically arranged within the single factor of general AS (Deacon & Abramowitz, 2006). Studies examining the correlates of these lower order factors demonstrate varying psychological associations with each factor (Blais et al., 2001; McWilliams, Stewart, & MacPherson, 2000; Taylor, Koch, Woody, & McLean, 1996; Zinbarg, Barlow, & Brown, 1997). Specifically, cognitive dyscontrol and somatic sensations have demonstrated the strongest associations with symptoms of depression (Blais et al., 2001; Grant, Beck, & Davila, 2007; Taylor et al., 1996). We hypothesized that symptoms of depression and problematic coping would both independently mediate the relationship between total AS and alcohol dependence. Additionally, based on the associations established in previous literature we hypothesized that the relationship between the lower order factors of cognitive dyscontrol (Blais et al., 2001) and somatic sensations (Grant et al., 2007, 2007) and alcohol dependence would be mediated by depression, whereas fear of socially observable symptoms of anxiety would not be mediated by symptoms of depression.

## 2. Method

Patients ( $n = 418$ ) were sequential admissions into an inpatient substance use treatment facility in Washington, D.C. from 2007 to 2010. At the time of admission into the treatment center, participants were required to submit a negative urine drug screen. Those with positive drug screens had to complete a detoxification program and evidence of no acute pharmacological effects of drug use before they were admitted to the facility; there was great variety in the detoxification programs used across participants, but most included medical assistance over several days. Inpatient treatment typically ranged from 28 to 180 days and was dependent on the patients' treatment funding sources. Patients were only permitted to leave the facility for scheduled appointments such as psychiatric and primary care appointments. Drug testing occurred on a weekly basis and any use was grounds for immediate removal from the center. Because patients were assessed early in their treatment, none had been removed from treatment at the time of assessment. Intake assessments were conducted by doctoral level graduate students and senior research staff with patients during their first week at the inpatient substance use treatment center.

The assessments served two purposes: (1) to provide diagnostic information to treatment staff at the center, and (2) to gather data for the current study. Patients were invited to participate in research following the intake assessment and were provided details regarding how information collected during the assessment would be used. Data for the current study includes only cases where informed consent was obtained from patients following the assessment (<5% of patients declined to provide informed consent). The study protocol was reviewed and approved by the University of Maryland Institutional Review Board.

## 3. Measurements

### 3.1. Alcohol dependence diagnosis (SCID-IV; First, Spitzer, Gibbon, & Williams, 1995a, 1995b)

Information regarding alcohol dependence diagnosis was garnered using the Structured Clinical Interview for the Diagnostic and Statistical Manual of Mental Disorders IV (SCID-IV; First et al., 1995a, 1995b).

### 3.2. The Anxiety Sensitivity Index (ASI; Reiss et al., 1986)

The ASI is a 16-item self-report measure of fear of or sensitivity to anxiety. Questions are rated on a 5-point scale ranging from "very little" to "very much" and assess beliefs regarding potential negative implications

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