



The interacting effect of depressive symptoms, gender, and distress tolerance on substance use problems among residential treatment-seeking substance users



Bina Ali^{a,*}, C.J. Seitz-Brown^b, Stacey B. Daughters^{c,**}

^a Department of Behavioral and Community Health, University of Maryland, College Park, MD 20742, USA

^b Department of Psychology, University of Maryland, College Park, MD 20742, USA

^c Department of Psychology, University of North Carolina, Chapel Hill, NC 27599, USA

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ABSTRACT

Background: Depression is associated with substance use problems; however, the specific individual characteristics influencing this association are not well identified. Empirical evidence and theory suggest that gender and distress tolerance—defined behaviorally as an individual's ability to persist in goal-directed behavior while experiencing negative affective states—are important underlying factors in this relationship. Hence, the purpose of the current study was to examine whether gender and distress tolerance moderate the relationship between depressive symptoms and substance use problems.

Methods: Participants included 189 substance users recruited from a residential substance abuse treatment center. The Short Inventory of Problems–Alcohol and Drugs scale was used to measure self-reported substance use problems. The Beck Depression Inventory was used to assess self-reported depressive symptoms. Gender was self-reported, and distress tolerance was behaviorally indexed by the Computerized Paced Auditory Serial Addition Task.

Results: Hierarchical linear regression analysis indicated a significant three-way interaction of depressive symptoms, gender, and distress tolerance on substance use problems, adjusting for relevant demographic variables, anxiety symptoms, impulsivity, as well as DSM-IV psychiatric disorders. Probing of this three-way interaction demonstrated a significant positive association between depressive symptoms and substance use problems among females with low distress tolerance.

Conclusion: Findings indicate that female treatment-seeking substance users with high levels of depressive symptoms exhibit greater substance use problems if they also evidence low distress tolerance. Study implications are discussed, including the development of prevention and intervention programs that target distress tolerance skills.

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1. Introduction

A large proportion of the United States population engages in substance use, and heavy use of substances is especially a concern for African American adults (Substance Abuse and Mental Health Services Administration [SAMHSA], 2012). Indeed, 13.7% of African American males and 5.5% of African American females meet criteria for past year substance abuse or dependence. Importantly, among substance users in both community (Gillespie et al., 2007; Hagman et al., 2009) and clinical (Alterman et al., 2009; Bender et al., 2007)

settings, heavy use of substances is associated with increased substance use problems (SUP), defined hereafter as negative physical (e.g., poor eating habits, declining physical health), psychological (e.g., mood changes, feelings of guilt), and social (e.g., damaged relationships and social life) consequences of substance use (Blanchard et al., 2003; Gillespie et al., 2007; Newcomb and Locke, 2005; Office of National Drug Control Policy, 2004). Substance use problems are a particular concern among African American substance users receiving treatment, who also evidence high rates of comorbid psychopathology (Chen et al., 2011). Previous study shows that elevated SUP are associated with poor treatment retention, even after accounting for clients' drug and alcohol severity and their readiness to change (Kiluk et al., 2013), highlighting the need to investigate the underlying factors and conditions related to SUP in this at-risk group.

* Corresponding author. Tel.: +1 301 405 0899.

** Corresponding author. Tel.: +1 919 962 9924.

E-mail addresses: binaali@umd.edu (B. Ali), daughter@unc.edu (S.B. Daughters).

One risk factor for SUP is elevated depressive symptoms. In addition to prospective studies indicating that depression significantly predicts the development and maintenance of substance use (King et al., 2004; Worley et al., 2012), cross-sectional studies demonstrate that depressive symptoms relate to greater alcohol use problems (Buckner et al., 2007; Gorka et al., 2012) and marijuana use problems (Buckner et al., 2007). Importantly, gender is associated with both depression and SUP among substance users. Female substance users in residential treatment have higher rates of comorbid depression and anxiety disorders than males (e.g., Zilberman et al., 2003), and they evidence significantly higher levels of SUP than their male counterparts (Kiluk et al., 2013).

A theoretical perspective that may be appropriate when examining differences in vulnerability for SUP among depressed substance users is the negative reinforcement model. The negative reinforcement model is extensively utilized in the substance use literature to understand the initiation and maintenance of substance use (Baker et al., 2004; review in Magidson et al., 2013). According to this theoretical model, the primary motivational basis for substance use is the reduction or avoidance of negative affective states, such as feelings of irritability, anxiety, and stress (Baker et al., 2004). The negative reinforcement model has also been extended to understand the occurrence of SUP (Ali et al., 2013; Gorka et al., 2012). For instance, individuals may engage in problematic behavior that aids in reducing negative affect either directly (e.g., risky sexual behavior, physical fights), or indirectly (e.g., illegal activity to obtain substances). A commonly used method of assessing the propensity to engage in behaviors motivated by negative reinforcement is measuring an individual's distress tolerance, defined behaviorally as the ability to persist in goal-directed activity while experiencing negative affective states (Daughters et al., 2005a).

Previous studies consistently find a significant relation between low distress tolerance and adverse substance use outcomes (Abrantes et al., 2008; Brown et al., 2002, 2009; Daughters et al., 2005a,b), including higher levels of SUP (Buckner et al., 2007; Bujarski et al., 2012; Howell et al., 2010; Simons and Gaher, 2005). Further, among community adults with low distress tolerance, depressive symptoms are significantly associated with alcohol use problems (Gorka et al., 2012). However, the interacting effect of distress tolerance with depressive symptoms and gender on SUP has yet to be examined in vulnerable clinical populations, such as African American treatment-seeking substance users. Therefore, the current study aims to examine the role of gender and distress tolerance in the relation between depressive symptoms and SUP among African American substance users in a residential substance abuse treatment center. Given the aforementioned empirical evidence, it was hypothesized that the relation of depressive symptoms to SUP will vary as a function of gender and distress tolerance, with greater depressive symptoms relating to increased SUP specifically among females with low distress tolerance.

2. Methods

2.1. Participants

A total of 189 participants (67.20% males) were recruited from a residential substance abuse treatment facility in Washington, DC. Treatment at this facility lasts between 30 and 180 days, and includes programs incorporating strategies from Alcoholics Anonymous and Narcotics Anonymous, as well as group sessions focusing on relapse prevention. Participants were recruited during their first week of treatment. The current study utilized baseline data collected for an ongoing longitudinal study that aims to assess the long-term impact of a clinical intervention to improve substance use outcomes. Eligibility criteria for the study included: (1) minimum of 18 years of age, (2) the ability to speak and read English sufficiently to complete study procedures, and (3) no current psychotic symptoms, as these symptoms may affect responses on the self-report measures and performance on the behavioral task assessing distress tolerance.

2.2. Procedure

All participants completed a screening interview administered by trained doctoral-level graduate students or senior research staff during the first week of treatment. The interview consisted of the Structured Clinical Interview for DSM-IV (SCID-IV; First et al., 1995) to assess mood disorders, anxiety disorders, psychotic symptoms, substance use disorders, borderline personality and antisocial personality disorders, as well as the Beck Depression Inventory (Beck et al., 1996). Following the interview, participants were invited to participate in research. Eligible participants were provided with a verbal description of the study, and interested participants provided written informed consent. Participants then completed a battery of self-report measures and a computerized behavioral distress tolerance task. The study protocol was reviewed and approved by the University Institutional Review Board.

2.3. Measures

2.3.1. Substance use problems (SUP). The dependent variable, SUP, was assessed using a 15-item self-report measure, the Short Inventory of Problems – Alcohol and Drugs (SIP-AD; Blanchard et al., 2003). This measure captures consequences of multiple drugs, including alcohol, across five domains: interpersonal (e.g., “My family has been hurt by my drinking or drug use”), intrapersonal (e.g., “I have been unhappy because of my drinking or drug use”), physical (e.g., “My physical health has been harmed by my drinking or drug use”), impulse control (e.g., “I have taken foolish risks when I have been drinking or using drugs”), and social (e.g., “I have failed to do what is expected of me because of my drinking or drug use”). Participants indicated how often each of the listed consequences occurred during the past 12 months due to their alcohol and drug use, responding on a scale ranging from 0 to 3 (“never,” “once or a few times,” “once or twice a week,” and “daily or almost daily”). The sum of the items provided the total score. The SIP-AD has demonstrated excellent psychometric properties in previous studies (Blanchard et al., 2003; Kiluk et al., 2013), as well as good internal consistency in the current study ($\alpha = 0.96$).

2.3.2. Depressive symptoms. The primary independent variable, depressive symptoms, was determined using the 21-item self-report measure, the Beck Depression Inventory (BDI-II; Beck et al., 1996). Participants reported on the level of a variety of symptoms in the past week, including “sadness” and “loss of pleasure.” The sum of the items was used as the total score, and a higher score indicated greater depressive symptoms. The instrument has shown excellent psychometric properties in previous studies (Beck et al., 1996; Sprinkle et al., 2002), and good internal consistency in this study ($\alpha = 0.93$).

2.3.3. Distress tolerance. Distress tolerance was measured using the *Computerized Paced Auditory Serial Addition Task* (PASAT-C; Lejuez et al., 2003). The PASAT-C has been shown to reliably increase participants' distress levels and has repeatedly been used as a behavioral measure of distress tolerance (Daughters et al., 2005a, 2008, 2009). In sum, participants are exposed to an increasingly difficult working memory task, accompanied by forced failure and negative auditory feedback. There are three levels in this task. Participants are given the option to quit the task on the final and most difficult level (i.e., low distress tolerance) or to persist for the entire duration for an undefined reward (i.e., high distress tolerance). The reader is referred to Daughters et al. (2005a) for a detailed description of the task.

2.3.4. Demographics. Participants self-reported their gender, age, race, marital status, income, and level of education.

2.3.5. Other potential covariates. Other potential covariates included psychiatric comorbidity and self-reported anxiety symptoms and impulsivity. The Structured Clinical Interview for the DSM-IV was used to assess for current Axis I disorders and Axis II disorders (SCID-IV; First et al., 1995). The following Axis I disorders were assessed: bipolar I, psychotic symptoms, panic disorder, social phobia, obsessive compulsive disorder, posttraumatic stress disorder, generalized anxiety disorder, and substance dependence. Diagnoses were only given when the disorder was not substance-induced or not due to a general medical condition. Axis II disorders that were assessed included borderline personality disorder and antisocial personality disorder. These Axis II disorders were selected for assessment since they are particularly prevalent among substance users (Kokkevi et al., 1998; Torrens et al., 2011). All SCID-IV interviewers underwent extensive training supervised by clinical psychology faculty prior to conducting independent interviews. The training certification process included viewing the complete video protocol for SCID-IV (First et al., 1995), observing two full interviews and conducting mock interviews with certified interviewers, conducting a final certification practice interview, and being observed while conducting two interviews with clients at the substance use treatment center. Interviewers also participated in weekly SCID-IV supervision throughout the duration of the study.

Self-reported anxiety symptoms and impulsivity were also examined given their association with SUP (Marmorstein et al., 2010; Petry, 2001; Stoltenberg et al., 2011). Anxiety symptoms were measured using the Beck Anxiety Inventory (BAI; Beck et al., 1988). Responses on this 21-item measure were obtained on a scale of 0 to 3, ranging from “not at all” to “severely.” The sum of the items was used as the total score, and a

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