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Rumination Mediates the Relationship Between Distress Tolerance and Depressive Symptoms Among Substance Users

Jessica F. Magidson,

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

Department of Psychiatry, Massachusetts General Hospital/Harvard Medical School, Boston, MA, USA

Alyson R. Listhaus,

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

C. J. Seitz-Brown,

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

Katelyn E. Anderson,

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

Briana Lindberg,

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

Alexis Wilson, and

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

Stacey B. Daughters

Department of Psychology, University of North Carolina, Chapel Hill, NC, USA

Jessica F. Magidson: jmagidson@partners.org; Stacey B. Daughters: daughter@email.unc.edu

Abstract

Distress tolerance has been implicated in the emergence of internalizing symptomatology, notably depressive symptoms. However, few studies have tested potential mechanisms underlying the relationship between distress tolerance and depressive symptoms, and further, this has not been tested among substance users, who commonly experience both low distress tolerance and elevated depressive symptoms. The current study focused on the construct of rumination, which has been suggested to be a coping response to stress associated with substance use and depression. Two forms of rumination, brooding and reflection, were tested as potential mediators of the relationship between distress tolerance and self-reported depressive symptoms among 128 individuals entering substance abuse treatment. Brooding (i.e., to overly focus on symptoms of distress) mediated the relationship between distress tolerance and depressive symptoms. However, reflection (i.e., to attempt to gain insight into problems) was unrelated to distress tolerance. Findings suggest the

important role of brooding as a mechanism underlying the relationship between distress tolerance and depressive symptomatology.

Keywords

Distress tolerance; Depressive symptoms; Rumination; Brooding; Reflection; Substance use

Introduction

Depressive symptoms are commonly elevated in substance using populations. Over 50 % of individuals present to substance abuse treatment with clinically significant depressive symptoms (Johnson et al. 2006), which are associated with increased likelihood of substance abuse treatment dropout (McKay et al. 2002; Tate et al. 2004; Thase et al. 2001) and relapse (Hasin et al. 2002). Despite the clinical significance of comorbid depression, few studies have tested conceptual models to better understand factors that contribute to depressive symptoms among substance users.

Emerging evidence suggests a relationship between distress tolerance (DT), defined broadly as one's capacity to withstand aversive physical and psychological states (Brown et al. 2005; Simons and Gaher 2005), and both elevated depressive symptoms (Abrantes et al. 2008; Daughters et al. 2009; Harrington 2006; Schmidt et al. 2006) and major depressive disorder (Ellis et al. 2010). Research has further established the link between DT and depressive symptoms specifically among substance using populations (Buckner et al. 2007; Gorka et al. 2012; O'Cleirigh et al. 2007). Despite this evidence, no studies to our knowledge have explored the mechanisms underlying the relationship between DT and depressive symptoms, and not specifically among substance users.

Negative reinforcement models suggest that an underlying motivation of behavior is the escape or avoidance of negative affective states (Baker et al. 2004). This framework has most commonly been applied to understanding addiction, such that an inability to tolerate aversive psychological (i.e., anxiety) and physical (i.e., withdrawal) states results in avoidance via substance use, and the subsequent development of substance dependence (Baker et al. 2004). Indeed, extensive evidence has suggested that low distress tolerance is a principal motive in the initiation of substance use, continuation and frequency of use, and relapse. Low distress tolerance has been associated with higher rates of alcohol use in early adolescence (Daughters et al. 2009; MacPherson et al. 2010), and among adults, has been associated with problematic substance use (O'Cleirigh et al. 2007; Simons and Gaher 2005), poor substance abuse treatment outcomes (Daughters et al. 2005), and greater self-reported coping motives for alcohol, marijuana, and cocaine use (O'Cleirigh et al. 2007; Simons and Gaher 2005; Zvolensky et al. 2009).

In addition to the well-established link with substance use, negative reinforcement models have also highlighted the important role of avoidance of distress in developing both internalizing and externalizing psychopathology (Glick and Orsillo 2011). A negative reinforcement-based framework applied to internalizing symptomatology suggests that individuals may escape or avoid aversive states internally via excessive worry or disengaging from reality without active problem solving. The relief provided by this escape behavior may increase the likelihood that individuals will also engage in this tendency in the future. This cycle ultimately may contribute to the emergence or worsening of internalizing symptoms over time (Abrantes et al. 2008; Buckner et al. 2007; Daughters et al. 2009; Ellis et al. 2010; Harrington 2006; Schmidt et al. 2006).

In line with a negative reinforcement framework, it is important to consider avoidance-based stress coping responses that are relevant to both depression and substance use. One response to stress that has been shown to be strongly related to the development of depressive symptoms that is also particularly relevant to substance use is rumination, which can be defined as the tendency to “repetitively and passively focus on symptoms of distress and on the possible causes and consequences of these symptoms” (Nolen-Hoeksema 1991). Indeed, extensive evidence suggests that rumination plays a strong role in the onset, severity, and duration of depressive symptoms (Nolen-Hoeksema et al. 2008; Watkins 2008). Rumination has been shown to predict future onset of depression (Just and Alloy 1997), development of depressive symptoms among adolescents (Abela and Hankin 2011), maintenance and/or exacerbation of depressed mood and depressive symptoms among adults (Katz and Bertelson 1993; Nolen-Hoeksema and Morrow 1991), greater depression severity in clinical (Just and Alloy 1997; Kuehner and Weber 1999) and non-clinical samples (Abela and Hankin 2011), as well as greater depressive symptoms and higher rates of relapse to major depression following depression treatment (e.g., even after controlling for previous history of depression and residual depressive symptoms; Michalak et al. 2011). Furthermore, there is evidence that increases in rumination moderate the relationship between distress and depressive symptoms (Abela and Hankin 2011; McIntosh et al. 2010). For instance, Abela and Hankin (2011) assessed adolescents aged 11–15 years ($n = 382$) every over the course of a 2 year period on self-reported rumination, depressive symptoms, major depressive episodes (MDEs), and stressful life events; rumination moderated the relationship between stressful life events and the future development of depressive symptoms and MDEs, such that individuals with higher levels of rumination were more likely to show a positive relationship between greater stressful life events and higher depressive symptoms and MDEs. McIntosh et al. (2010) found similar results that rumination moderated the relationship between daily stressors and depressed mood among adults with and without major depression ($n = 70$).

Numerous studies have also demonstrated that rumination is elevated among substance users (e.g., comparing problem vs. social drinkers; Caselli et al. 2008), related to higher rates of using substances to cope (Nolen-Hoeksema and Harrell 2002), greater alcohol-related problems over time among women (Nolen-Hoeksema and Harrell 2002), as well as higher rates of substance abuse among adolescents (Nolen-Hoeksema et al. 2007). Indeed, substance use may be an escape behavior for individuals prone to rumination and may provide relief from the distress associated with negative forms of rumination (Nolen-Hoeksema et al. 2007). A growing body of research suggests that rumination may not be a unitary construct, but rather there may be several types of rumination (e.g., Bagby and Parker 2001; Cox et al. 2001; Roberts et al. 1998; Watkins 2004). Specifically, evidence suggests that “reflection” (i.e., self-reflection, attempting to gain insight into problems; Treynor et al. 2003) should be distinguished from “brooding,” (i.e., overly focusing on symptoms; Bagby and Parker 2001; Cox et al. 2001; Roberts et al. 1998; Trapnell and Campbell 1999; Treynor et al. 2003), and that these different forms of rumination have been shown to be differentially related to depressive symptoms (Roberts et al. 1998; Treynor et al. 2003; Watkins 2004). In particular, brooding, as opposed to reflection, is more often related to poor depression and substance use outcomes (Burwell and Shirk 2007; Raes 2010; Raes and Hermans 2008). For instance, Treynor et al. (2003) found that brooding predicted the development of depression over time, whereas reflection was unrelated to later depression. Similarly, Willem et al. (2011) found that brooding was related to worse substance use outcomes, whereas reflection may be a protective factor for substance use outcomes.

Brooding forms of rumination have been associated with greater maladaptive disengagement/avoidance coping strategies and may contribute to increased likelihood for

“escapist” behaviors (e.g., purging, alcohol use; Nolen-Hoeksema et al. 2007), whereas reflection has been related to more adaptive coping strategies (Burwell and Shirk 2007). Interpretations of these findings have suggested that brooding may be a form of emotional avoidance (Borkovec 1994), while reflection may be a means of processing and experiencing the emotion as opposed to avoidance (Martin and Tesser 1996; Mayer and Salovey 1997). Experimental studies also support this interpretation, such that individuals who brooded on negative mood showed worse outcomes (e.g., greater self-reported anger) than those instructed to productively reflect on reasons for the emotions (Kross et al. 2005). In sum, existing research aiming to deconstruct rumination suggests that brooding may represent a form of denial and/or avoidance in response to negative affect that may be central to the emergence of psychopathology (Burwell and Shirk 2007).

Although research examining distress tolerance and rumination specifically has been limited, there has also been some evidence suggesting that low distress tolerance is associated with rumination. For instance, among individuals with borderline personality disorder (BPD), low distress tolerance was more strongly associated with rumination as opposed to more adaptive forms of mindful self-focus following an angry mood induction (Sauer and Baer 2011). Further, rumination was followed by greater levels of negative affect compared to more adaptive mindful self-focus (Sauer and Baer 2011), which is in line with extensive literature linking rumination with dysphoria and depressive symptoms (Nolen-Hoeksema 1991). Despite its relevance to both DT and depression, to date no studies have tested rumination as a potential mechanism underlying the relationship between DT and depressive symptoms, and not in substance using populations where this may be important. As such, the purpose of the current study was twofold: first, to establish the link between low DT and depressive symptoms among substance users, and second, to test the mediating role of two forms of rumination (i.e., brooding and reflection). We hypothesized that brooding, but not reflection, would mediate the relationship between distress tolerance and depressive symptoms.

Methods

Participants

The current study included 128 participants from a large, Mid-Atlantic urban residential substance abuse treatment center. The participants were predominantly African American (92.2 %, $n = 118$), male (56.3 %, $n = 72$), with a mean age of 43.0 (SD = 10.9). Additional participant characteristics are displayed in Table 1. Residents at this facility include individuals who are mandated to treatment by the court system or voluntarily referred by government agencies. Residents are required to have completed full detoxification and have a negative urine drug screen upon admission to the treatment facility. Regular urinalysis drug testing is conducted and any substance use, with the exception of nicotine and caffeine, is grounds for program dismissal. Residents are not permitted to leave the center grounds aside from treatment-required activities (e.g., group retreats, physician visits).

Procedure

All potential participants were screened within their first week of residential substance abuse treatment as part of two clinical trials being conducted at the treatment center. The screening consisted of the psychotic symptoms screener of the Structured Clinical Interview for DSM-IV (SCID-IV; First et al. 2002). Inclusion criteria included being in the first 2 weeks of substance abuse treatment and having completed full detoxification prior to treatment entry. Participants were excluded if they presented with current psychotic symptoms, as this has the potential to interfere with the ability to provide informed consent and/or report accurately in the study assessment. Eligible individuals were provided detailed information

about the study and those interested provided informed consent. Assessment included the measures listed below. Baseline assessment procedures were identical across trials, and all data was collected prior to randomization to treatment condition or initiation of any treatment sessions for both studies. All procedures were approved by the University Institutional Review Board.

Measures

The *Beck Depression Inventory (BDI-II)* (Beck et al. 1996) is a widely used 21-item self-report measure of depressive symptoms. Sample items include “sadness” and “loss of pleasure.” Higher scores indicate greater depression severity. The BDI-II has excellent internal consistency ($\alpha = 0.92$) and convergent validity (e.g., $r = 0.71$ with the Hamilton Rating Scale for Depression; Beck et al. 1996; Nezu et al. 2000). Internal consistency in the current sample was excellent ($\alpha = 0.92$).

Distress Tolerance Scale (DTS) (Simons and Gaher 2005) is a 15-item self-report measure of psychological distress which assesses perceived ability to withstand negative emotional states. The measure is typically examined as a total score of four scales: (1) Tolerance of psychological distress (e.g., “I can’t handle feeling distressed or upset”); (2) Appraisal of distress (e.g., “My feelings of distress or being upset are not acceptable”); (3) Absorption of attention by negative emotion (e.g., “When I feel distressed or upset, I cannot help but concentrate on how bad the distress actually feels”); (4) Regulation efforts to alleviate distress (e.g., “When I feel distressed or upset I must do something about it immediately”). The total DTS score was used to assess psychological DT in the current study. Higher scores indicate greater tolerance of psychological distress. In previous research, the DTS has demonstrated excellent internal consistency ($\alpha = 0.89$) and adequate 6-month test–retest reliability ($r = 0.61$; Simons and Gaher 2005). Internal consistency was good in the current sample ($\alpha = 0.87$).

Drug Use and Availability (DUA) is a self-report measure modeled after the alcohol use disorders identification test (AUDIT; Saunders et al. 1993), and has been used in previous research to assess the frequency of illicit drug use (e.g., Lejuez et al. 2005). Specifically, drug use frequency in the past year (e.g., “About how often did you use marijuana in the past 12 months/year?”) was assessed across 8 drug classes, including marijuana, alcohol, crack/cocaine, ecstasy, methamphetamines, sedatives, opioids, and PCP. Responses were on a 6-point scale ranging from 0 “never” to 5 “4 or more times per week.” Only substances that were used in >5 % of the sample were included in analyses.

Ruminative Response Scale (RRS) (Subscale of the Response Styles Questionnaire [RSQ]; Nolen-Hoeksema and Morrow 1991) is a 22-item self-report measure that assesses the frequency of thinking or doing certain things when feeling sad, down, or depressed. The RRS has three subscales: (1) Brooding (e.g., “Think ‘What am I doing to deserve this?’”); (2) Reflection (e.g., “Think about recent events to try to understand why you are depressed?”); (3) Depression-related (e.g., “Think about how alone you feel.”). Higher scores indicate more rumination/self-focused attention regarding depression. In previous research, the brooding subscale has demonstrated acceptable internal consistency ($\alpha = 0.77$) and test–retest reliability ($r = 0.62$). The reflection subscale has demonstrated acceptable internal consistency ($\alpha = 0.72$) and test–retest reliability ($r = 0.60$), and the depression subscale has demonstrated good internal consistency ($\alpha = 0.82$) and test–retest reliability ($r = 0.60$) (Treyner et al. 2003; Conway et al. 2000; Roelofs et al. 2006). Factor analytic studies of the RRS subscales demonstrated that some items of the depression subscale overlap with symptoms of depression; as such, previous research has recommend focusing only on the brooding and reflection subscales when evaluating rumination in the context of

depression (Treyner et al. 2003). In the current sample, internal consistency of the brooding subscale was good ($\alpha = 0.85$) and acceptable ($\alpha = 0.77$) for the reflection subscale.

Statistical Analyses

Potential covariates were identified by examining the relationship between demographic variables and drug use frequency with depressive symptoms. Next, we ran a correlation matrix of the independent variable (IV: distress tolerance), mediators (reflection and brooding forms of rumination), and the dependent variable (DV: depressive symptoms) to test the relationship between distress tolerance and depressive symptoms, as well as to identify candidate mediators. We next conducted two sets of analyses to test for mediation. We first ran a series of linear regression analyses to test whether the four criteria set by Baron and Kenny (1986) were met. We then utilized nonparametric bootstrapping to test for significance of the indirect effect (Preacher and Hayes 2004; Preacher and Hayes 2008).

Results

As listed in Table 1, none of the potential covariates were significantly related to depressive symptoms¹ (all p s > 0.1), and as such were not included in subsequent analyses. Next, we tested the relationship between distress tolerance and depressive symptoms in this population and to identify potential mediators. As indicated in Table 2, distress tolerance was significantly related to depressive symptoms and only one type of rumination (brooding) was related to both the IV and DV. Reflection was not related to the IV and as such was not tested as a potential mediator.

To test the mediating role of brooding in the relationship between distress tolerance and depressive symptoms, we first ran a series of linear regression analyses to test whether the four criteria set by Baron and Kenny (1986) were met. There was (1) a significant direct effect of the IV (distress tolerance) on the DV (depressive symptoms) ($B = -0.21$, $t(127) = -2.38$, $p < 0.05$; $R^2 = 0.04$); (2) a significant effect of the IV (distress tolerance) on the potential mediator (brooding) ($B = -0.29$, $t(127) = -3.64$, $p < 0.001$; $R^2 = 0.08$); (3) a significant effect of the mediator (brooding) on the DV (depressive symptoms) ($B = 0.33$, $t(127) = 3.94$, $p < 0.001$; $R^2 = 0.11$); and (4) the effect of the IV (distress tolerance) on the DV (depressive symptoms) after controlling for the mediator (brooding) was no longer significant ($B = -0.13$, $t(127) = -1.44$, $p = 0.15$), but the effect of the mediator (brooding) remained significant in the model ($B = 0.30$, $t(127) = 3.41$, $p < 0.001$; $R^2 = 0.12$) (see also Fig. 1 for a depiction of these relationships).

We also utilized nonparametric bootstrapping to test for significance of the indirect effect (Preacher and Hayes 2004; Preacher and Hayes 2008). In these analyses, the indirect effect is significant if the 95 % bias-corrected or percentile-based confidence intervals (CIs) for the indirect effect do not include 0 (Preacher and Hayes 2004; Preacher and Hayes 2008). We used the INDIRECT SPSS Macro developed by Preacher and Hayes (2008) to conduct mediation analyses based on 5,000 bootstrapped samples (as recommended by Hayes 2009) using bias-corrected and percentile-based 95 % confidence intervals (CIs). Results indicated that there was a significant indirect effect of brooding [$IE = -1.02$, $SE = 0.46$; Bias Corrected 95 % CI: $LL = -2.22$, $UL = -0.35$; Percentile-Based 95 % CI: $LL = -2.02$, $UL = -0.23$]; because zero is not included in either of the 95 % CIs, we can conclude that the indirect effect of brooding is significantly different from zero at $p < 0.05$ (two-tailed). Specifically, individuals with lower levels of distress tolerance were more likely to brood in

¹BDI scores were slightly positively skewed ($skewness = 1.02$, $SE = 0.21$). As such, we log transformed BDI scores, which improved skewness ($skewness = -0.62$, $SE = 0.21$). Transforming scores did not affect results across all analyses. To preserve the clinical significance of depression scores, the non-transformed data are reported here.

response to negative affect, and through higher levels of brooding, were more likely to have depressive symptoms.²

Discussion

The current study examined the relationship between distress tolerance and depressive symptoms in a substance using population and tested the role of rumination as a mediator of this relationship. As expected, there was a strong negative relationship between self-reported distress tolerance and depressive symptoms such that lower levels of psychological distress tolerance were significantly related to greater levels of self-reported depressive symptoms. Furthermore, results indicated that brooding, but not reflection, mediated the relationship between distress tolerance and depressive symptoms, such that individuals with lower levels of distress tolerance were more likely to brood in response to negative affect, and through higher levels of brooding, reported higher levels of depressive symptoms. The findings shed light on a potential process by which low levels of distress tolerance may be associated with depressive symptoms, specifically pointing to the tendency to overly focus on symptoms of distress.

The finding that brooding, but not reflection, mediates the relationship between distress tolerance and depressive symptoms is in line with previous research linking brooding to a greater tendency for disengagement and avoidance coping strategies and the notion that brooding may be a form of emotional avoidance (Borkovec 1994). Although speculative, the findings may suggest that individuals who are less able to tolerate psychological distress may be more likely to brood as a form of coping with this distress. In turn, higher rates of brooding accounted for the relationship between low distress tolerance and higher levels of depressive symptoms. Meanwhile, levels of distress tolerance were unrelated to reflection; thus, findings do not indicate that higher levels of distress tolerance are associated with increased reflection or propensity for active coping strategies. Although we cannot ascertain the function of brooding (e.g., as a form of avoidance) given the current study design, the fact that brooding, but not reflection, accounted for the relationship between distress tolerance and depressive symptoms suggests a closer link between brooding and a poor response to affective distress as compared to reflection. There has been some literature to date that has conceptualized rumination as a form of experiential avoidance (Moulds et al. 2007; Borkovec et al. 1998) or a process that leads to avoidance (Bjornsson et al. 2010), which may explain how rumination contributes to depressive symptoms (Bjornsson et al. 2010) and other escape behaviors (i.e., alcohol use; Nolen-Hoeksema and Harrell 2002). Going forward, it will be important to further dissect the function of brooding as a means to avoid affective distress that in turn may be associated with greater depressive symptomatology.

Results should be interpreted in light of important study limitations, including a cross-sectional design, which limits our ability to test longitudinal mediation and infer causality. Another significant limitation is reliance on self-report measures for all constructs assessed. Given the high correlations often found amongst measures of negative affect-related measures more generally, it is important in future work to replicate findings using clinician-based or more objective measurement (e.g., a clinician-based rating of depressive symptoms and a behavioral assessment of distress tolerance). Future research may consider also incorporating self-report or behavioral indices of physical DT in addition to psychological DT. Finally, the current sample represents a substance using sample that was comprised

²We conducted the same analyses with a contrast between the two indirect effects of brooding and reflection. In these analyses, there remained a significant indirect effect of brooding, but the indirect effect of reflection was non-significant (using both bias-corrected and percentile-based 95 % CIs).

primarily of low-income, urban largely African American individuals. Given the specificity of the sample, as well as evidence in particular suggesting that the relationship between low DT, depressive symptoms and substance use may be a particular vulnerability among African Americans (Dennhardt and Murphy 2011), present findings may not generalize to other samples. Additionally, the sample had relatively low levels of depressive symptoms compared to what has been found in other populations (e.g., Johnson et al. 2006); specifically, approximately 18 % of the sample had mild depressive symptoms (14–19 on the BDI-II) and 18.75 % were in the moderate/severe range (20 and above). Additionally, depressive symptoms were unrelated to demographic characteristics typically found to be associated with depression (e.g., gender; Nolen-Hoeksema and Girgus 1994). These factors may also limit generalizability of findings to other samples.

Despite these limitations, there are important future directions and implications stemming from these findings. Findings inform our understanding of *how* low distress tolerance may contribute to the development and maintenance of depressive symptoms in a high-risk sample of low-income substance users. By pinpointing specific processes through which distress tolerance impacts depressive symptoms, we can develop targeted interventions and improve efficacy and parsimony of existing interventions. Additionally, findings may inform screening tools, such that individuals prone to brooding may be identified and enrolled in targeted intervention efforts. In sum, findings support the need for targeting the specific process of brooding as a potential means to reduce depressive symptoms, in particular among individuals with low distress tolerance.

Indeed, recently developed interventions to target rumination specifically in the treatment of depression have shown beneficial effects on residual depressive symptoms and sustained reductions in depression; further, improvements in depression were mediated by changes in rumination (Watkins et al. 2007). There has also been some evidence that mindfulness-based approaches may reduce rumination and subsequent depressive symptoms (Deyo et al. 2009). Additionally, given recent evidence suggesting that interventions targeting increased capacity to tolerate psychological distress, for instance through dialectical behavior therapy (DBT) skills training, may have effects on even very treatment-resistant depressive symptoms (Harley et al. 2008), future directions may consider testing interventions that combine both these skill-based interventions with rumination-focused depression interventions, which is in line with current interventions for treating substance users with difficulty regulating emotion (e.g., DBT for borderline personality disorder and drug dependence; Linehan et al. 1999). Ultimately, by identifying substance users with a tendency for brooding we can integrate these targeted interventions into substance abuse treatment, which may show benefits for improved depressive symptoms and subsequent substance use treatment outcomes.

Other important future directions of this work include replication in other samples, expanding the model to include other internalizing disorders, in particular anxiety, given the even more established link between distress tolerance and anxiety disorders (Leyro et al. 2010; Schmidt et al. 2006, 2007) as well as recent work hypothesizing rumination may be a transdiagnostic factor accounting for both depression and anxiety (McLaughlin and Nolen-Hoeksema 2011). Future work may also consider further delineating what subset of depressive symptoms (e.g., vegetative, cognitive) among substance users are best captured by this model. Additionally, given that DT may be a shared vulnerability across depression and substance use, future work may also consider testing these relationships examining substance use frequency as the main outcome. Finally, it also will be important that future models incorporate other cognitive and behavioral mechanisms to contrast other potential indirect effects in this relationship and to ultimately better match treatment and prevention efforts to specific subgroups of substance users.

Despite these key limitations, preliminary findings do illustrate the important role of rumination, and in particular brooding, as a potential mechanism underlying the relationship between DT and depressive symptomatology among substance users, furthering our understanding of *how* distress tolerance may relate to depressive symptoms.

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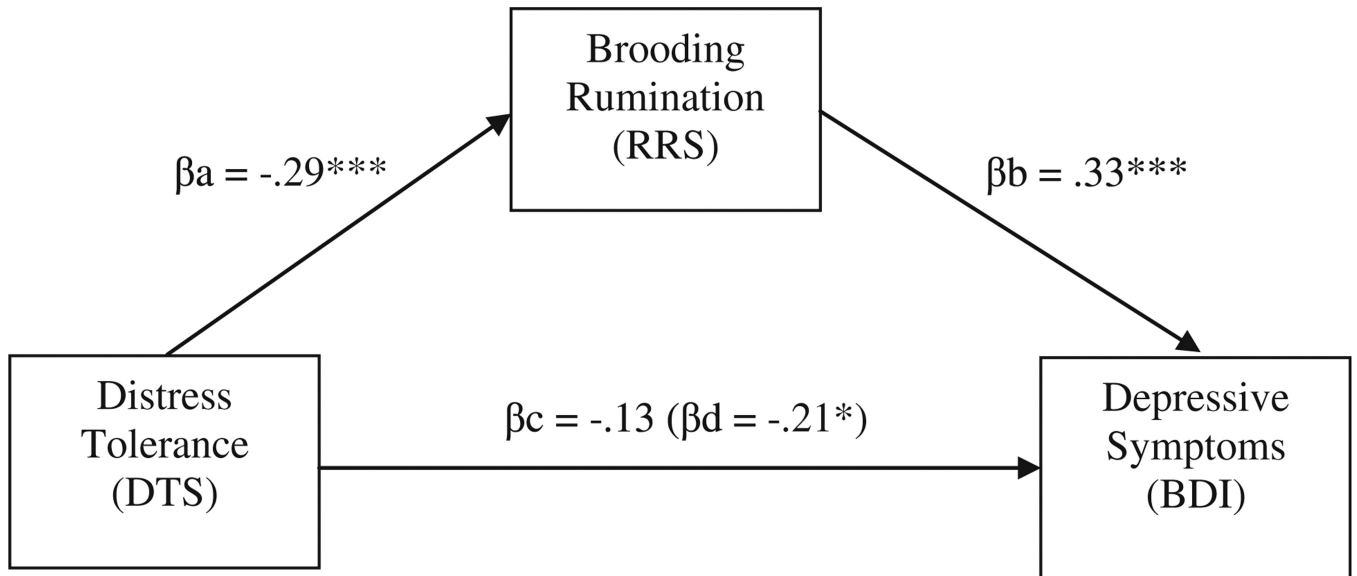
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**Fig. 1.**

Linear regression values of brooding as a mediator of the relationship between distress tolerance and depressive symptoms. $*p < 0.05$, $**p < 0.01$, $***p < 0.001$. βa , standardized beta coefficient of the IV \rightarrow the mediator; βb , standardized beta coefficient for the mediator \rightarrow DV with IV in the model; βc , standardized beta coefficient for the IV with mediator in the model; βd , standardized beta coefficient for the IV without the mediator in the model; DTS, distress tolerance scale total score; BDI-II, Beck Depression Inventory-II Total Score; RRS, ruminative response scale (brooding subscale)

Table 1

Relationship between participant characteristics and Beck Depression Inventory (BDI)

	Total sample (n = 128)	BDI score (SD)	Statistic	p value
<i>Demographics</i>				
Age	43 (SD = 10.9)		r = 0.14	0.12
Gender			F(1, 126) = 0.16	0.69
Male	56.3 %	11.35 (9.35)		
Female	43.7 %	12.09 (11.42)		
Ethnicity			F(4, 123) = 0.66	0.62
Black/African American	92.2 %	11.90 (10.44)		
White/Caucasian	3.1 %	5.75 (8.88)		
Hispanic/Latino	0.8 %	18.00 (0.00)		
Native American/American Indian	0.8 %	2.00 (0.00)		
Other	3.1 %	11.75 (6.13)		
Marital status			F(4, 123) = 0.49	0.75
Single and never married	60.9 %	12.35 (9.89)		
Divorced	13.3 %	9.12 (13.05)		
Living with a partner as if married	11.7 %	10.47 (7.72)		
Married but separated	7.8 %	10.90 (10.52)		
Married	6.3 %	13.75 (12.48)		
Education			F(2, 125) = 0.63	0.54
% <HS education	35.9 %	13.03 (11.16)		
% HS graduate or GED	38.3 %	11.80 (10.32)		
% >HS graduate or GED	25.8 %	10.00 (9.20)		
Employment status prior to treatment			F(6, 121) = 1.29	0.27
Unemployed	86.7 %	12.31 (10.51)		
Employed part-time	3.9 %	8.40 (9.81)		
Retired	3.1 %	2.75 (1.71)		
Employed full-time	2.3 %	9.33 (2.87)		
Full-time student	1.6 %	19.5 (4.95)		
Home-maker	1.6 %	1.50 (2.12)		
Full-time student/employed part-time	0.08 %	5.00 (0.00)		
Income			F(1, 126) = 0.67	0.41
<\$20,000	68.0 %	12.18 (10.96)		
\$20,000	32.0 %	10.59 (8.65)		
Court mandated to treatment			F(1, 126) = 0.50	0.48
Yes	71.9 %	11.21 (9.50)		
No	28.1 %	12.00 (11.30)		
<i>Drug use^d</i>				
Crack/cocaine	28.9 %	12.29 (11.26)	F(5, 120) = 0.26	0.94
Opioid	11.7 %	10.35 (8.96)	F(5, 120) = 1.62	0.17
Marijuana	14.8 %	9.90 (9.92)	F(5, 120) = 1.31	0.27

	Total sample (<i>n</i> = 128)	BDI score (SD)	Statistic	<i>p</i> value
Alcohol	41.4 %	10.33 (1.30)	$F(5, 120) = 1.78$	0.12
PCP	11.7 %	11.15 (7.60)	$F(5, 119) = 0.67$	0.65

^a% values are % of sample reporting at least weekly use in the past year. Statistic values are based upon all frequency categories (ranging from 0 “never” to 5 “4 or more times per week”)

Table 2

Correlation matrix between distress tolerance, rumination, and depressive symptoms

	Mean (SD)	1	2	3	4	5	6	7	8
1. DTS Total	2.78 (0.83)	-	0.82 ^{***}	0.85 ^{***}	0.89 ^{***}	0.70 ^{***}	-0.28 ^{***}	-0.29 ^{***}	-0.14
2. DTS Tolerance	2.71 (1.11)		-	0.69 ^{***}	0.62 ^{***}	0.39 ^{***}	-0.12	-0.17	-0.08
3. DTS Absorption	2.85 (1.08)			-	0.69 ^{***}	0.44 ^{***}	-0.20 [*]	-0.31 ^{***}	-0.19 [*]
4. DTS Appraisal	3.05 (0.81)				-	0.53 ^{***}	-0.30 ^{***}	-0.29 ^{**}	-0.11
5. DTS Regulation	2.56 (1.03)					-	0.02	-0.12	-0.13
6. BDI-II Total	11.67 (10.27)						-	0.33 ^{***}	0.29 ^{**}
7. RRS Brooding	11.34 (3.62)							-	0.61 ^{***}
8. RRS Reflect	11.04 (3.41)								-

DTS Distress Tolerance Scale, BDI-II Beck Depression Inventory-II Total Score, RRS Ruminative Response Scale

 $p < 0.001$;**
 $p < 0.01$,*
 $p < 0.05$