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Sleep Disturbance and Emotion Dysregulation as Transdiagnostic Processes in a Comorbid Sample

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Abstract

Sleep disturbance and emotion dysregulation have been identified as etiologic and maintaining factors for a range of psychopathology and separate literatures support their relationships to anxiety, depression, PTSD, and alcohol dependence (AD) symptom severity. Previous studies have examined these relationships in isolation, failing to account for the high rates of comorbidity among disorders. It is not yet known whether these processes uniquely predict symptom severity in each of these domains. Participants were 220 patients in residential substance abuse treatment, who had experienced a potentially traumatic event and exceeded screening cutoffs for probable PTSD and problematic alcohol use. Controlling for emotion dysregulation and the interrelationships among the outcome variables, insomnia was uniquely associated with anxiety ($B = .27, p < .001$), depression ($B = .25, p < .001$), PTSD ($B = .22, p < .001$), and AD ($B = .17, p = .01$) symptom severity. Similarly, controlling for insomnia, emotion dysregulation was uniquely associated with anxiety ($B = .40, p < .001$), depression ($B = .47, p < .001$), PTSD ($B = .38, p < .001$), and AD ($B = .26, p < .001$) symptom severity. Insomnia and emotion dysregulation appear to be transdiagnostic processes uniquely associated with symptom severity across a number of different domains and might be important treatment targets for individuals with PTSD and AD.

Keywords

insomnia; emotion regulation; transdiagnostic; PTSD; alcohol dependence; Difficulties in Emotion Regulation Scale

High rates of comorbidity among disorders have been consistently found in both epidemiological (e.g., Kessler, Chiu, Demler, & Walters, 2005) and clinical (e.g., Brown, Campbell, Lehman, Grisham, & Mancill, 2001) samples, and increase drastically when subclinical presentations are considered (cf. Nolen-Hoeksema & Watkins, 2011). Recent transdiagnostic approaches to psychopathology have aimed to identify common etiologic

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and maintaining processes that underlie these disorders and account for the high rates of comorbidity. To be considered transdiagnostic, a process must vary along a continuum, ranging from normal experience to dysfunction and disturbances must be evidenced across disorders (e.g., Nolen-Hoeksema & Watkins, 2011). Two potential transdiagnostic processes that have been identified in the literature are emotion dysregulation and insomnia (Harvey et al., 2011; Kring & Werner, 2004).

Emotion Dysregulation & Psychopathology

Emotion dysregulation refers to difficulties modulating emotional experiences in a way that is responsive to both the immediate context of the situation and the long-term objectives of the individual (Fairholme, Boisseau, Ellard, Ehrenreich & Barlow, 2010; Kring & Werner, 2004). Studies have found support for emotion dysregulation as a maintaining factor for a range of psychiatric disorders, including panic disorder (Levitt, Brown, Orsillo, & Barlow, 2004), social phobia (Turk, Heimberg, Luterek, Mennin, & Fresco, 2004), generalized anxiety disorder (Mennin, Heimberg, Turk, & Fresco, 2005), obsessive-compulsive disorder (Cogle, Timpano, & Goetz, 2012), unipolar depression (Liverant, Brown, Barlow, & Roemer, 2008), posttraumatic stress disorder (PTSD; Tull, Barrett, McMillan, & Roemer, 2007), and alcohol dependence (AD; Fox, Hong & Sinha, 2008). Studies have also consistently found relationships between psychopathology symptom severity and an overreliance on maladaptive emotion regulation strategies (such as avoidance, rumination, suppression, and worry) and reduced use of more effective emotion regulation strategies (such as problem solving and reappraisal). A recent meta-analysis found that both anxiety and depression were associated with increased avoidance, rumination, and suppression and decreased problem solving (Aldao, Nolen-Hoeksema, & Schweizer, 2010). Strong associations have also been found between self-reported difficulties in emotion regulation and PTSD severity above and beyond related constructs such as negative affect (Tull et al., 2007). Likewise, patients with alcohol dependence reported significantly greater difficulties regulating their emotions compared to a social drinking control group (Fox et al., 2008). Emotion regulation skill deficits have also been shown to predict alcohol use during and after AD treatment (Berking et al., 2011). Collectively, these findings suggest that emotion dysregulation might be an important maintaining factor for a range of disorders, highlighting the need for additional research to better understand the nature of this relationship.

Sleep Disturbance & Psychopathology

Sleep disturbance is specified as a diagnostic criterion for many mood and anxiety disorders (APA, 2000). Evidence from epidemiological studies shows that insomnia-type sleep disturbance is ubiquitous, occurring across the range of psychopathology (e.g., Ford & Kamerow, 1989), including panic disorder (Sheehan, Ballenger, & Jacobsen, 1980), social phobia (Stein, Kroft, & Walker, 1993), generalized anxiety disorder (Fuller, Waters, Binks, & Anderson, 1997), obsessive-compulsive disorder (Insel et al., 1982), depression (Buysse et al., 2008), PTSD (Ohayon & Shapiro, 2000), and AD (Brower et al., 2001). This high rate of cooccurrence has led some to suggest that sleep disturbance might be an etiologic and maintaining factor for psychopathology (cf. Harvey et al., 2011). Studies have consistently found a unique relationship between insomnia severity and psychopathology symptom severity. Taylor and colleagues (2005) found a strong relationship between insomnia severity and both anxiety and depression severity while controlling for potentially confounding variables such as demographic and other health-related factors. Insomnia severity is strongly related to PTSD severity, controlling for psychiatric comorbidity and other sociodemographic variables (Germain et al., 2004). Although the nature of the relationship between sleep disturbance and alcohol use is complex, increasing evidence supports a bidirectional relationship with insomnia increasing the risk for alcohol

consumption and heavy alcohol use adversely altering the neurobiological substrates associated with sleep (Brower, 2001). Furthermore, the presence of insomnia predicts AD chronicity and relapse above and beyond age of onset, psychiatric history, AD severity, depression severity, and other sociodemographic variables (Brower et al., 2001).

Present Study

Despite separate literatures linking emotion dysregulation and insomnia to symptom severity in each of these four domains, no study has examined the simultaneous relationship of these two processes to psychopathology. Regarding the relationship between emotion dysregulation and sleep disturbance, research increasingly supports that these two factors are reciprocally related. A number of studies have found support for a deleterious relationship between insomnia and emotion regulation, such that acute sleep disturbance impairs emotion regulation capabilities (e.g., Yoo, Gujar, Hu, Jolesz, & Walker, 2007). A separate literature supports the idea that emotion dysregulation, or more specifically, an overreliance on maladaptive emotion regulation strategies, can impair sleep (Gruber, Eidelman, & Harvey, 2008; Guastella & Moulds, 2007). This has led theorists to propose that sleep disturbance and emotion dysregulation might be mutually maintaining factors (Harvey et al., 2011). However, it is not yet known how emotion dysregulation and insomnia might operate together to predict psychopathology symptom severity. The majority of studies that have examined the relationship of each of these processes to psychopathology severity have utilized non-comorbid samples and have typically relied on between-group analyses (e.g., comparing clinical to non-clinical participants). Previous studies have failed to adequately account for comorbidity among these four domains of psychopathology, limiting the nature of the conclusions that can be drawn. Therefore, the present study sought to examine the simultaneous, unique predictive power of emotion dysregulation and insomnia on psychopathology symptom severity across four separate but related domains of psychopathology: anxiety, depression, PTSD, and AD. We hypothesized that both emotion dysregulation and insomnia would be related to symptom severity in each domain while controlling for interrelationships among the other domains.

Methods

Participants & Procedure

All incoming clients at a residential substance use treatment facility were informed about the opportunity to participate in an ongoing study (investigating efficacy of psychotherapy for trauma) by their program therapist. Exclusion criteria were current psychosis or acute mania/hypomania. Interested clients who reported experiencing a potentially traumatic event (PTE) completed the *PTSD Checklist* (PCL; Weathers, Litz, Herman, Huska, & Keane, 1993) and the *Alcohol Use Disorders Identification Test* (AUDIT; Saunders, Aasland, Babor, de la Fuente, & Grant, 1993) to screen for study eligibility according to widely-used clinical cutoffs. Individuals scoring ≥ 44 on the PCL (Blanchard, Jones-Alexander, Buckley, & Forneris, 1996) and ≥ 8 on the AUDIT (Babor, de la Fuente, Saunders, & Grant, 1992) were invited to a comprehensive assessment session, where participants completed an Institutional Review Board-approved, documented informed consent procedure. A total of 220 adults (108 women) consented and completed the measures applicable to the current study as part of a baseline assessment applicable to the larger study (see Table 1).

Measures

Difficulties in Emotion Regulation Scale—(DERS; Gratz & Roemer, 2004). The DERS is a 36-item questionnaire comprised of six subscales assessing different dimensions of emotion dysregulation, including: nonacceptance of emotion (NONACCEPT), difficulties

engaging in goal-directed behaviors (GOALS), impulse control difficulties (IMPULSE), limited access to effective regulatory strategies (STRATEGIES), reduced emotional clarity (CLARITY), and a lack of emotional awareness (AWARE). Higher scores reflect greater difficulties regulating emotion across each domain. A recent study evaluating the factor structure of the DERS found that dropping AWARE significantly improved the scale's psychometric properties (Bardeen, Fergus, & Orcutt, 2012). AWARE exhibits relatively weaker correlations with the other subscales and the total score (see Table 2; also see Bardeen et al., 2012; Tull et al., 2007). Inspection of the items revealed that AWARE is comprised of all reverse scored items. Reverse scored items have frequently been found to negatively impact scale psychometric properties and methodologists have argued against including such items in scale development (Brown, 2006; Rodebaugh, Woods, Heimberg, 2007; Spector et al., 1997). Thus, for the present study, we dropped the 5-item AWARE subscale, removed the remaining 6 reverse scored items from the other subscales, recalculated the remaining five subscales without the reverse scored items, and calculated a new 25-item total score based on the five revised subscales (DERS-R). The revised version of this scale (without the AWARE subscale) showed acceptable psychometric properties in a previous study (Bardeen et al., 2012). In the present study, internal consistency for the scales were adequate and correlations between the subscales and the DERS-R total score were all strong (see Table 2).

A confirmatory factor analysis (CFA) model was fit to the data using Mplus 5.2 (Muthen & Muthen, 1998–2008) in order to evaluate the appropriateness of this revised scoring system in the current sample. The 5-factor model utilizing the 25 non-reverse scored items provided adequate fit to the data, $\chi^2(265) = 609.03, p < .001$, comparative fit index (CFI) = .89, root mean square error of approximation (RMSEA) = .08 (90% CI [.07, .09]), and standardized root mean square residual (SRMR) = .07. Completely standardized factor loadings were all significant and large (range = .60 to .88)¹. Further psychometric evaluation of the DERS-R is needed; however, although only preliminary, these CFA results suggest the DERS-R is an appropriate measure of emotion dysregulation in the current sample.

Insomnia Severity Index—(ISI; Morin, 1993). The 7-item ISI assesses perceived severity of sleep difficulties and is widely-used as a screening and outcome measure. It demonstrates adequate internal consistency, strong concurrent and predictive validity (Bastien, Vallieres, & Morin, 2001) and displayed adequate internal consistency in the present sample, $\alpha = .86$.

Beck Anxiety Inventory—(BAI; Beck & Steer, 1990). The BAI is a 21-item measure of cognitive and somatic anxiety symptoms and has demonstrated good internal consistency, test-retest reliability and convergent, discriminant and criterion-related validity (Beck & Steer, 1990). Internal consistency was high in the present study, $\alpha = .94$.

Beck Depression Inventory-II—(BDI-II; Beck & Steer, 1996). The BDI-II is a widely used 21-item measure of depression symptoms. It has demonstrated good internal consistency, test-retest reliability and convergent validity (Beck & Steer, 1996). For the present study, we used the total score minus the sleep item (BDI-S) for study analyses, in order to not artificially inflate observed relationships with sleep disturbance. Total score

¹Inspection of localized areas of strain (i.e., standardized residuals and modification indices) revealed additional modifications could further improve model fit. For instance, the addition of correlated residuals between item pairs with similar wording (e.g., items 11 “When I’m upset, I become angry with myself for feeling that way” and 12 “When I’m upset, I become embarrassed for feeling that way”) or the elimination of items suggesting potential (e.g., item 30 “When I’m upset, I start to feel bad about myself”). However, in order to minimize the risk of capitalizing on idiosyncrasies of the present sample, no further modifications were made to the scale. Further psychometric evaluation of the DERS-R is needed to clarify these points. Full results are available from first author.

values (BDI-II) are also reported to aide in characterizing the sample and to facilitate comparisons across studies. Both scoring methods demonstrated strong internal consistency in the present sample, $\alpha = .91$ for both BDI-II and BDI-S.

Impact of Events Scale-Revised—(IES-R; Weiss & Marmar, 1997). The 22-item IES-R assesses the three *DSM-IV* PTSD symptom clusters (intrusion, avoidance, and arousal) and was completed with reference to the target trauma to be used in treatment. The IES-R has demonstrated good internal consistency and convergence with other measures of PTSD (Weiss & Marmar, 1997). In order to reduce artificial overlap among independent and dependent variables, we used the total score minus the sleep item (IESR-S) for analyses. Total score values (IES-R) are also reported for the purposes of characterizing the sample. Both scoring methods demonstrated strong internal consistency in the present sample, IES-R $\alpha = .93$ IESR-S $\alpha = .92$.

Alcohol Dependence Scale—(ADS; Skinner & Horn, 1984). The ADS is a 25-item measure of alcohol-related problems, including withdrawal, tolerance, alcohol seeking behavior and impaired control over drinking. It has demonstrated strong psychometric properties (Skinner & Horn, 1984) and evidenced strong internal consistency in this sample, $\alpha = .92$.

Data Analysis

Raw data were analyzed using Mplus 5.2 (Muthen & Muthen, 1998–2008). Missing data were minimal (listwise $N = 208$, pairwise N s ranged from 214 to 219) and were accommodated in all models using direct maximum likelihood under the assumption of missingness at random. The data analytic scheme allowed for the simultaneous estimation and evaluation of model parameters and primary study hypotheses within a single data analytic model as opposed to separate multiple regressions for each of the four symptom severity domains (which would not control for the interrelationship among the domains).

Results

Descriptive statistics for the primary study variables are presented in Table 2. Bivariate relationships among the study variables were examined in order to establish that the two potential transdiagnostic processes were related to psychopathology symptom severity. As predicted, insomnia severity was related to symptom severity in each of the four domains: anxiety ($r = .41$), depression ($r = .41$), PTSD ($r = .40$), and AD ($r = .26$; all p values $< .001$). Emotion dysregulation was also associated with symptom severity for anxiety ($r = .49$), depression ($r = .56$), PTSD ($r = .45$), and AD ($r = .32$; all p values $< .001$).

Next, simultaneous multiple regression was conducted to evaluate whether the two predictors were associated with unique variance in each of the four outcome variables (see Figure 1). Controlling for the effect of emotion dysregulation as well as the interrelationships among the outcome variables, sleep disturbance was uniquely associated with anxiety ($B = .27, p < .001$), depression ($B = .25, p < .001$), PTSD ($B = .22, p = .001$), and AD ($B = .17, p = .01$) symptom severity. Similarly, emotion dysregulation was also uniquely associated with anxiety ($B = .40, p < .001$), depression ($B = .47, p < .001$), PTSD ($B = .38, p < .001$), and AD ($B = .26, p < .001$) symptom severity while controlling for the effect of sleep disturbance². Together these two processes accounted for 26.7% of the

²This model was re-run with age, sex, education and race entered as covariates and the findings did not change with the inclusion of these variables. The model was rerun with an interaction term between DERS-R and ISI, which was nonsignificant.

variance in anxiety, 33.8% in depression, 23.9% in PTSD, and 13.0% in AD symptom severity.

Finally, a follow-up exploratory simultaneous multiple regression was conducted using the 5 DERS-R subscales in order to examine relationships between specific facets of emotion dysregulation and symptom severity (see Table 4). Controlling for the effect of insomnia severity and the interrelationships among the outcome variables, STRATEGIES was uniquely associated with anxiety ($B = .27, p < .001$) and depression ($B = .25, p < .001$). GOALS and IMPULSE were significant predictors of PTSD ($B = .23$ and $B = .17$, both p s $< .05$). However, after controlling for insomnia severity, none of the 5 DERS-R subscales significantly predicted AD symptom severity in the follow-up analysis.

Discussion

The primary purpose of this study was to evaluate whether insomnia and emotion dysregulation might serve as transdiagnostic processes in a highly comorbid, diagnostically heterogeneous sample. Consistent with predictions and prior research (Berking et al., 2011; Liverant et al., 2008; Mennin et al., 2005; Tull et al., 2007), emotion dysregulation was uniquely associated with anxiety, depression, PTSD, and AD symptom severity. This extends previous investigations to examine emotion dysregulation as a specific process involved in each of four separate domains of psychopathology while controlling for the interrelationships among the other domains. Examination of the specific facets of emotion dysregulation associated with psychopathology symptom severity revealed that anxiety and depressive symptoms were related to individuals having limited access to effective emotion regulation strategies. Alternatively, PTSD symptoms were more associated with difficulties engaging in goal directed behavior and impulse control difficulties. This is consistent with research using an analog sample that has identified a relationship between PTSD symptoms and the difficulties engaging in goal directed behavior and impulse control difficulties subscales of the DERS (e.g., Tull et al., 2007). The present study extends these findings to support these unique relationships above and beyond shared relations with anxiety, depression, and alcohol dependence symptom severity in a clinical sample. Inspection of the items that comprise these subscales suggest that PTSD symptom severity might be uniquely related to behavioral dyscontrol in the face of distress (e.g., “When I’m upset, I have difficulty getting work done” and “When I’m upset, I lose control over my behaviors”), whereas anxiety and depressive symptom severity might be more strongly related to beliefs about the nature of emotions (e.g., “When I’m upset, I believe that I’ll end up feeling very depressed”) and one’s ability to tolerate and regulate those emotions (e.g., “When I’m upset, I believe that there is nothing I can do to make myself feel better”).

Consistent with hypotheses and a burgeoning literature, insomnia was also related to each of the four domains of psychopathology symptom severity. Previous studies have identified relationships between insomnia and anxiety (LeBlanc et al., 2007), depression (Buysse et al., 2008), PTSD (Germain et al., 2004), and AD (Brower et al., 2001) symptom severity. However, this study is the first to our knowledge to examine the unique relationship of insomnia to these four domains while controlling for one another. Despite abundant evidence to the contrary, the view that insomnia is secondary to primary psychiatric disorders, such as depression, remains prevalent (cf. Harvey, 2001). These findings support the conceptualization of insomnia-type sleep disturbance as an important factor that is relevant to a broad range of domains of psychopathology independent of its relationship to depressed mood or PTSD.

The present study also represents one of the first attempts to examine the simultaneous relationship of insomnia and emotion dysregulation to psychopathology symptom severity.

Although previous studies have examined these relationships separately, none have examined whether these two factors might be uniquely related to psychopathology symptom severity. Theorists have posited that sleep disturbance and emotion dysregulation might be reciprocally related factors. On the one hand, sleep disturbance appears to worsen mood and decrease one's ability to effectively regulate emotions, and on the other hand, impaired emotion regulation leads to increased negative affect and arousal, thus disrupting the subsequent night's sleep (Harvey et al., 2011). The results from this study are consistent with this perspective, with each of these two factors accounting for significant variance in symptom severity from four domains of psychopathology while controlling for the other factor, suggesting that both factors are clinically relevant targets for intervention.

The present findings have a number of intriguing implications for treatment. The finding that emotion dysregulation was related to symptom severity across four domains of psychopathology emphasizes the importance of this factor as a treatment target in not only anxiety and mood disorders, but also for dual disorder and substance use populations. This is consistent with recommendations of Dimeff and Linehan (2008) that an adaptation of dialectical behavior therapy (DBT), a treatment that directly addresses emotion dysregulation may be helpful for patients who are dually diagnosed or patients with treatment resistant substance use disorders (see also Coffey, Schumacher, Brimo, & Brady, 2005). Indeed, there is some preliminary evidence that improvements in emotion regulation account for reductions in substance use among women with comorbid SUD and borderline personality disorder following treatment with DBT (Axelrod, Perepletchikova, Holtzman, & Sinha, 2011).

Similarly, the finding that sleep disturbance was relevant across such a range of psychopathology underlines its importance as a treatment target. This is especially significant given that modules directly targeting sleep disturbance are not part of current evidence-based treatments for anxiety, depression, PTSD or AD and are infrequently incorporated into treatment beyond a discussion of basic sleep hygiene. However, cognitive-behavior therapy for insomnia (CBT-I; an evidence-based treatment for sleep disturbance) has been increasingly applied in cases where insomnia is comorbid with other medical and psychiatric disorders (see Smith, Huang, & Manber, 2005). Consistent with the mutual maintenance hypothesis, there is evidence that treating sleep disturbance also provides benefit to the comorbid condition (Belleville et al., 2011; Krakow et al., 2001; Manber et al., 2008; Taylor et al., 2007; but see Arnedt et al., 2011). Further research exploring the potentially synergistic effect of targeting sleep disturbance on comorbid disorders is needed.

A number of treatments incorporate elements specifically targeting emotion regulation (Barlow et al., 2011; Linehan, 1993) or have been developed specifically to target emotion dysregulation (e.g., Gratz & Tull, 2011). However, none of these treatments directly target sleep disturbance (although basic sleep hygiene is a component of Linehan's 1993 skills manual). Based on the mutual maintenance hypothesis, Harvey and colleagues (2011) have suggested that identifying which factor (sleep disturbance or emotion dysregulation) has greater therapeutic leverage might lead to more efficacious treatments. However, both factors might need to be addressed in treatment in order to produce durable treatment gains. For instance, helping to stabilize sleep prior to addressing emotion regulation skills might facilitate skill acquisition and improve treatment outcome. This is a promising avenue for future research.

There are a number of limitations in the present study that warrant consideration. First, although the severity and degree of comorbidity in the current sample is a strength of this study, it also potentially limits the generalizability of our findings to samples with lower rates of comorbidity and increases the potential for threats to internal validity by third

variables, such as medication or illicit drug use. It is also possible that participants in a treatment-seeking sample might be more emotionally dysregulated than individuals not seeking treatment and additional potentially relevant constructs such as temperament (i.e., neuroticism/negative affectivity) were not assessed. Thus, replication and extension of these findings are critical. Further psychometric evaluation of the DERS-R, especially in clinical samples, is needed to establish its appropriateness for use outside of the current sample. The cross-sectional design of the study and its reliance on individuals with current substance use and psychiatric disorders, limits the nature of the conclusions that can be drawn about the temporal sequencing of these factors and precludes interpretation about the etiologic significance of these findings. Finally, the study relied exclusively on self-report assessment of key constructs, which might be particularly susceptible to mood-state distortion and future studies will benefit from adopting a multimodal approach to assessment (e.g., incorporating objective assessment of insomnia and laboratory-based measures of emotion regulation).

Conclusion

The results support the role of insomnia-type sleep disturbance and emotion dysregulation as potential transdiagnostic processes, relevant across a range of psychopathology symptoms. Consistent with the mutual maintenance hypothesis, insomnia and emotion dysregulation each uniquely predicted anxiety, depression, PTSD, and AD symptom severity while controlling for the other in a highly comorbid sample. Consistent with recent NIMH initiatives (Sanislow et al., 2010), the identification of etiologic and maintaining factors that cut across diagnostic presentations represents an important direction for future research. The identification of such factors might lead to the development of briefer and more efficacious treatments and simultaneously aid in dissemination and implementation efforts by developing briefer treatments with broader diagnostic applicability.

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Highlights

Examined sleep disturbance and emotion dysregulation as transdiagnostic processes.

Both processes uniquely predicted anxiety, depression, PTSD and AD symptom severity.

Sleep disturbance and emotion dysregulation may be important treatment targets.

Figure 1.

Path model evaluating relationship of sleep disturbance and emotion dysregulation on four domains of psychopathology symptom severity in a comorbid sample ($N = 220$). Note: Standardized regression weights reflect unique associations between predictors and outcome variables, controlling for the effect of the other predictor variable as well as the interrelationships among outcomes. * = $p < .05$, *** = $p < .001$. ISI = Insomnia Severity Index; DERS-R = Difficulties with Emotion Regulation Scale-Revised total score; BAI = Beck Anxiety Inventory; BDI-S = Beck Depression Inventory-II - minus sleep item; IESR-S = Impact of Event Scale-Revised - minus sleep items (items 2 & 15); ADS = Alcohol Dependence Scale.

Table 1

Participant Demographic and Clinical Characteristics (N=220)

	Mean (SD)
Age	33.7 (10.2)
Gender	
Female	47.7%
Race	
White	77.7%
Black/African American	20.0%
Other	1.4%
Education	
< 12 th	14.5%
H.S. diploma	29.1%
Post H.S.	44.1%
> 4 yr degree	11.3%
Employment ^a	
Full-Time	16.4%
Part-Time	7.3%
Unemployed	49.5%
Homemaker	5.5%
Student	6.4%
Retired	1.8%
Pharmacological Treatment	
Current psychiatric medication	57.3%
Prior treatment history	
Substance use-related hospitalization	60.6%
Substance use-related outpatient treatment	53.2%
Psychiatric hospitalization	33.5%
Psychiatric outpatient treatment	33.9%
Current alcohol and drug abuse or dependence	
Alcohol use disorder	91%
Cocaine use disorder	50%
Amphetamine use disorder	22%
Marijuana use disorder	34%
Sedative use disorder	32%
Opiate use disorder	38%
Hallucinogen use disorder	2%
Any drug use disorder	99%

	Mean (SD)
Current comorbid psychiatric conditions	
Mood disorder	87%
PTSD	89%
Other anxiety disorder	79%
Anorexia or Bulimia Nervosa	6%
Days since last drink of alcohol	
	19.9 (16.6)

Note:

^aEmployment status prior to entering treatment.

Table 2

Internal consistency of and correlations among DERS Total Score and Subscales with and without reverse scored items removed ($N = 220$)

	1	2	3	4	5	6	7
1. NONACCEPT	.88						
2. GOALS	.85	.50					
3. IMPULSE	.88	.39	.62				
4. STRATEGIES	.87	.59	.72	.66			
5. CLARITY	.72	.27	.45	.36	.43		
6. AWARE	.76	.13*	.10*	.19*	.30		
7. DERS-R TOTAL	.94	.76	.83	.79	.91	.56	.19
8. DERS TOTAL	.93	.69	.78	.74	.86	.61	.47
							.95

Note: NONACCEPT = DERS-R Nonacceptance of Emotional Experiences subscale; GOALS = DERS-R Difficulty Engaging in Goal-Directed Behavior subscale; IMPULSE = DERS-R Impulse Control Difficulties subscale; STRATEGIES = DERS-R Limited Access to Strategies for Emotion Regulation subscale; CLARITY = DERS-R Lack of Emotional Clarity subscale; AWARE = DERS Lack of Awareness of Emotions subscale (not included in DERS-R); DERS-R TOTAL = Difficulties with Emotion Regulation Scale-Revised (DERS-R) total score (no reverse scored items); DERS TOTAL = Difficulties with Emotion Regulation Scale (DERS) total score (all items). Internal consistency estimates are Cronbach's alpha. All correlation coefficients are significant $p < .05$, except

* $p > .05$

Table 3
Descriptive Statistics and Correlations among Primary Study Variables ($N = 220$)

	ISI	DESR-R	BAI	BDI-II	BDI-S	IESR-R	IESR-S	M	SD
ISI								17.71	6.67
DESR-R	.35							73.44	19.21
BAI	.41	.49						27.13	14.44
BDI-II	.44	.56	.63					29.02	11.09
BDI-S	.41	.56	.62	1.00				27.35	10.69
IESR-R	.41	.46	.47	.45	.44			49.03	18.32
IESR-S	.35	.45	.46	.44	.43	.99		44.28	16.54
ADS	.26	.32	.38	.27	.27	.26	.26	24.31	10.56

Note: All p values < .001. ISI = Insomnia Severity Index; DESR-R = Difficulties with Emotion Regulation Scale Revised total score; BAI = Beck Anxiety Inventory; BDI-II = Beck Depression Inventory-II; BDI-S = Beck Depression Inventory-II - minus sleep item; IESR-R = Impact of Event Scale-Revised; IESR-S = Impact of Event Scale-Revised - minus sleep items (items 2 & 15); ADS = Alcohol Dependence Scale.

Table 4

Path model coefficients evaluating relationship of sleep disturbance and five facets of emotion dysregulation on four domains of psychopathology symptom severity ($N = 220$)

Predictor	Outcome Variable			
	BAI	BDI-S	IESR-S	ADS
ISI	.29 ***	.24 ***	.23 ***	.17 **
NONACCEPT	-.13	.05	.04	.12
GOALS	.10	.10	.23 *	-.09
IMPULSE	.04	-.11	.17 *	.10
STRATEGIES	.38 ***	.44 ***	-.00	.13
CLARITY	.01	.06	.03	.10

Note: Standardized regression weights reflect unique associations between predictors and outcome variables, controlling for the effect of the other predictor variable as well as the interrelationships among outcomes.

* = $p < .05$,

** = $p < .01$,

*** = $p < .001$. ISI = Insomnia Severity Index; NONACCEPT = DERS-R Nonacceptance of Emotional Experiences subscale; GOALS = DERS-R Difficulty Engaging in Goal-Directed Behavior subscale; IMPULSE = DERS-R Impulse Control Difficulties subscale; STRATEGIES = DERS-R Limited Access to Strategies for Emotion Regulation subscale; CLARITY = DERS-R Lack of Emotional Clarity subscale; BAI = Beck Anxiety Inventory; BDI-S = Beck Depression Inventory-II - minus sleep item; IESR-S = Impact of Event Scale-Revised - minus sleep items (items 2 & 15); ADS = Alcohol Dependence Scale.