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Shorter communication

Transdiagnostic emotion regulation processes in bipolar disorder and insomnia

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ABSTRACT

Research and treatment have traditionally adopted a 'disorder-focused' approach by targeting one specific disorder, aiming to understanding its cause, maintenance and treatment. The aim of the present study was to contribute to the burgeoning interest in examining common, or 'transdiagnostic,' processes across disorders. Three candidate transdiagnostic processes involved in emotion regulation – rumination, worry, and automatic negative thoughts – were examined in euthymic bipolar I disorder ($n = 21$) and insomnia ($n = 19$), and a non-clinical control group ($n = 20$). Rumination and worry were endorsed to a larger degree by the bipolar and insomnia groups compared to the control group. However, while the bipolar group had more negative automatic thoughts than the control group, there were no significant differences in negative automatic thoughts between the bipolar and insomnia groups or the insomnia and control groups. These results suggested that rumination and worry, but not negative automatic thoughts, might be common across bipolar disorder and insomnia. However, these findings no longer remained significant when current symptoms of anxiety and depression were controlled for. Prospective and experimental studies are needed to test the extent to which these processes contribute to the etiology or maintenance of insomnia and bipolar disorder.

Introduction

The dominant schemes driving mental health classification and research have tended to rely on a 'disorder-focused approach' that targets a specific disorder to understand its etiology and course. Although there is no doubt that this approach has been productive in providing a common language between clinicians and researchers and advancing research on a particular disorder, it has several potential limitations. First, it does not provide a clear path forward for treating comorbid cases, which are the rule rather than the exception (Kessler, Chiu, Demler, & Walters, 2005). Second, it burdens clinicians who must learn multiple protocols for specific disorders though these protocols often share common theoretical underpinnings. Third, it does not capitalize on the observation that many psychological processes are common across several diagnoses (i.e., are 'transdiagnostic').

We acknowledge that the debate between disorder-focused and transdiagnostic approaches that examine common psychological processes across disorders is not new. Indeed, several researchers have noted the benefits of attending to transdiagnostic processes for improving the understanding and treatment of comorbidity, hastening the application of advances made in one disorder to others, and for devising interventions (Barlow, Allen, & Choate, 2004; Fairburn, Cooper, & Shafran, 2003; Harvey, Watkins, Mansell, & Shafran, 2004; Hayes, Wilson, Gifford, Follette, & Strosahl, 1996).

The goal of the present study was to continue the process of establishing the extent to which a transdiagnostic perspective has utility. We chose to focus on bipolar disorder and insomnia. Bipolar I disorder is defined by a lifetime history of at least one manic episode (American Psychiatric Association, 2000) and most patients also experience periods of depression. In contrast, insomnia involves difficulty falling asleep, maintaining sleep, and/or experiencing nonrestorative sleep (American Sleep Disorders Association, 1997). Recent work suggests these two disorders may actually share common psychological processes, such as sleep disturbance (e.g., Harvey, Schmidt, Scarna, Neitzert-Semler, & Goodwin, 2005). There is less evidence regarding the transdiagnostic nature of other important processes across these two disorders.

We examined three candidate transdiagnostic processes – rumination, worry, and negative automatic thoughts – in the present study. Each is understood to play a significant role in emotion regulation, including the onset and maintenance of negative mood that is associated with subjective distress and functional impairment (Beck, 1964; Borkovec, Ray, & Stoeber, 1998; Nolen-Hoeksema, 2000). A definition and our rationale for the inclusion of each of these processes will now be provided.

Rumination has been defined as thoughts and behaviors that repetitively focus an individual's attention on the content, potential causes, and possible consequences of his or her affective state in

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a manner not conducive to problem-solving (Lyubomirsky & Nolen-Hoeksema, 1995). Preliminary investigation indicates that rumination is associated with both depressive (e.g., Johnson & Fingerhut, 2004) and inter-episode (i.e., euthymic) phases of bipolar disorder (Thomas, Knowles, Tai, & Bentall, 2006). Although there is no literature examining rumination in insomnia, experimental and descriptive studies suggest an association between rumination and poor sleep quality (e.g., Guastella & Moulds, 2007; Harvey, 2005).

Worry has been defined as an uncontrollable sequence of negative images and thoughts (Borkovec et al., 1998) that leads to emotion dysregulation (Menin, Heimberg, Turk, & Fresco, 2005). Worry is more future-focused than rumination (e.g., Segerstrom, Tsao, Alden, & Craske, 2000). Research on worry has been conducted primarily in the context of generalized anxiety disorder (McLaughlin, Borkovec, & Sibrava, 2007). Researchers have begun to documented its importance in insomnia (Harvey, 2004) and have begun to document the presence of worry in bipolar disorder (Akiskal et al., 2006).

Negative automatic thoughts are implicit, rapid, and automatic thoughts that trigger negative affect (e.g., Beck, 1964). Depressive and anxious automatic thoughts are two types of negative automatic thoughts that have been emphasized in models of the etiology, maintenance, and treatment for many psychological disorders (e.g., Beck, 1967). Both were investigated in the present study. Negative automatic thoughts have been implicated in bipolar disorder (Reilly-Harrington, Alloy, Fresco & Whitehouse, 1999) and insomnia (Harvey, 2005).

The present study

Although the three candidate transdiagnostic processes have received attention separately in bipolar disorder and insomnia, it is necessary to directly compare the two disorders and administer identical measures of the candidate processes in one study to answer the question of whether these processes are transdiagnostic across these disorders. On the basis of accruing evidence for transdiagnostic processes, we predicted that (1) participants in the bipolar and insomnia groups would report significantly more worry, rumination, and negative automatic thoughts (both anxious and depressive thoughts) relative to the non-clinical group and that (2) participants in the bipolar and insomnia groups would not significantly differ from one another in their report of these three processes (thereby indicating that the processes are transdiagnostic).

Method

Participants

Three groups of participants were included in the study: 21 bipolar I participants (BP), 19 participants with primary insomnia (INS), and 20 non-clinical participants (NC). The 21 BP participants had a primary axis I DSM-IV-TR (American Psychiatric Association, 2000) diagnosis of bipolar I disorder, which was ascertained using the Structured Clinical Interview for DSM-IV (SCID-IV; Spitzer, Williams, Gibbon, & First, 1990). We focused on euthymic bipolar participants to examine whether the targeted processes represent trait-like, rather than mood-specific, features. Participants in the BP group were confirmed to be euthymic according to both SCID criteria (Spitzer et al., 1990) and standardized cutoff scores from the Clinician-Rated Inventory of Depressive Symptoms (IDS-C; Rush, Gullion, Basco, Jarrett, & Trivedi, 1996) (mean = 7.44, SD = 3.26) and the Young Mania Rating Scale (YMRS; Young, Biggs, Ziegler, & Meyer, 1978) (mean = 2.32, SD = 1.53). For the BP group, the average age at onset was 15.50 years (SD = 4.86), average illness duration was 20.33 years (SD = 14.03), and a lifetime average of 9.05 (SD = 8.03) manic/hypomanic episodes and 10.16 (SD = 10.56) major depressive episodes were reported. In the past year, participants in the BP group reported an average of .72 (SD = .83) manic/hypomanic and .83 (SD = .71) major depressive episodes. All participants in the BP group were receiving psychotropic medication, including lithium ($n = 3$), anticonvulsants ($n = 14$); antidepressants ($n = 18$), neuroleptics ($n = 10$); benzodiazepines ($n = 3$), stimulants ($n = 1$), and over-the-counter medication for sleep disturbance ($n = 1$). Given the standards of care for treatment of bipolar disorder, a drug-free BP participant group would be unfeasible and unrepresentative.

The 19 INS participants had a primary axis I diagnosis of primary insomnia, as assessed by the Insomnia Diagnostic Interview (IDI; Harvey et al., 2003). The average length of sleep disturbance for INS participants was 22.89 years (SD = 14.28). Six participants in the INS group were taking medications which included sedative hypnotics ($n = 2$), benzodiazepines ($n = 3$), serotonin reuptake inhibitors ($n = 1$), and over-the-counter medications ($n = 3$).

Given that bipolar disorder and insomnia are commonly comorbid with one or more Axis I disorder (e.g., Kessler, Rubinow, Holmes, Abelson, & Zhao, 1997; Ohayon & Roth, 2001), we did not exclude BP or INS participants on the basis of comorbidities. However, we ensured that bipolar disorder was the primary diagnosis for the BP group and that insomnia was the primary diagnosis for the INS group, defined as the disorder currently most distressing and disabling (Di Nardo, Moras, Barlow, Rapee, & Brown, 1993). For BP participants, comorbidities included panic disorder ($n = 1$), agoraphobia ($n = 1$), social phobia ($n = 4$), specific phobia ($n = 5$), obsessive-compulsive disorder ($n = 2$), generalized anxiety disorder ($n = 4$), anorexia nervosa ($n = 1$), and binge eating disorder ($n = 1$). For the INS group comorbidities included generalized anxiety disorder ($n = 3$). Five participants in the BP group also met criteria for current insomnia, consistent with prior literature (e.g., Harvey et al., 2005).

Finally, the NC group consisted of 20 non-clinical community participants who did not meet DSM-IV criteria for any lifetime Axis I disorder or criteria for any major sleep disturbance.

Measures

Structured Clinical Interview for DSM-IV (SCID)

The SCID-IV (Spitzer et al., 1990) was administered to confirm that participants in the BP group met DSM-IV criteria for bipolar I disorder, to ascertain whether BP or INS participants met criteria for any comorbid Axis I disorder(s), and to ensure that NC participants did not meet criteria for any lifetime Axis I disorders. Trained doctoral candidates in clinical psychology conducted all interviews.

Insomnia Diagnostic Interview (IDI)

The IDI (Harvey et al., 2003) is comprised of five sections that assess for the presence of each of the DSM-IV-TR criteria for primary insomnia. The IDI was administered to INS participants since, at that time, the Duke Structured Interview for Sleep Disorders (DSISD) was not available. In an unpublished sample of 55 individuals with insomnia, the IDI shows high internal consistency (=.87), sensitivity (92%), and specificity (89%).

Duke Structured Interview for Sleep Disorders (DSISD)

The DSISD (Edinger, Kirby, et al., 2004) was developed to ascertain Research Diagnostic Criteria (Edinger, Bonnet, et al., 2004) defined sleep disorder diagnoses, as well as sleep disorders within both the DSM-IV-TR (American Psychiatric Association Task Force on DSM-IV, 2000) and ICSD (American Sleep Disorders Association, 1997) nosologies. The DSISD was administered to our NC participants to confirm the absence of sleep disturbance and to BP participants to assess for comorbid insomnia.

Beck Depression Inventory (BDI)

The 21-item BDI (Beck, Ward, Mendelson, Mock, & Erbaugh, 1961) served as the primary measure of current depressive symptoms. Items on the BDI are summed to reflect current depression severity, with scores ranging from 0 to 63.

Beck Anxiety Inventory (BAI)

The BAI (Beck, Epstein, Brown, & Steer, 1988) is a 21-item self-report measure assessing the frequency of physical and cognitive anxiety symptoms over the past week, with scores ranging from 0 to 63. The BAI demonstrates good internal consistency, reliability, and validity (e.g., Fydrich, Dowdall, & Chambless, 1992).

Global Rumination Scale (GRS)

The GRS (McIntosh & Martin, 1992) is a 10-item measure of trait rumination consisting of self-statements (e.g., "I seldom think about things that happened in the past"), with scores ranging from 10 to 70. The GRS demonstrates good test–retest reliability and discriminant validity (McIntosh & Martin, 1992).

Penn State Worry Questionnaire (PSWQ)

The PSWQ (Meyer, Miller, Metzger, & Borkovec, 1990) is a self-report measure of trait pathological worry that assesses the persistence of worry across time and circumstances, perceived controllability of the worry, and the intensity of the worry. It consists of 16 statements related to worrying, with scores ranging from 0 to 80. The PSWQ has high validity and good test–retest reliability (e.g., Molina & Borkovec, 1994).

Cognitions Checklist (CCL)

The CCL (Beck, Brown, & Steer, 1987) the prevalence of depressive and anxious by instructing participants to rate the frequency of 26 negative automatic thoughts, with total scores range from 0 to 104 (a maximum score of 52 may be obtained on each scale). The CCL allows for the assessment of the prevalence of anxious and depressive automatic thoughts separately as well as the overall presence of negative automatic thoughts. Acceptable reliability and discriminant and convergent validity for both subscales have been demonstrated (Beck et al., 1987).

Procedure

Participants in the BP and NC groups were recruited at the University of California, Berkeley and participants in the INS group were recruited from the Oxford University. At Berkeley, the clinical interviews included the SCID and DSISD. At Oxford, the IDI was administered in place of the DSISD. Participants who met criteria for one of the three participant groups then completed self-report questionnaires of psychiatric symptoms, rumination, worry, and negative automatic thoughts.

Results

Demographics and between-group differences in symptoms

Demographic data for the three groups and scores on the two current symptom questionnaires are summarized in Table 1. The three groups did not differ with respect to gender composition, $\chi^2(1, n = 60) = 1.53$, *ns*, or years of education, $F(2, 51) = .77$, *ns*. They did differ with respect to age, $F(2, 59) = 5.38$, $p < .01$. Post-hoc analyses (with a Tukey correction) indicated that the BP and NC groups did not significantly differ in age, $F(1,37) = .06$, *ns*. However, the INS group was significantly older than both the BP, $F(1,37) = 1.71$, $p < .01$ and NC groups, $F(1,37) = 1.03$, $p < .01$. Given established relationships between aging and worry (Brenes, 2006) as well as rumination (Phillips, Henry, Hosie, & Milne, 2006), age was included as a covariate in all analyses. Statistical analyses for potential ethnic differences between the groups were not conducted due to small sample size.

Table 1
Demographic information and current symptom measures for study groups ($N = 60$)

	BP ($n = 21$)	INS ($n = 19$)	NC ($n = 20$)	χ^2 or F
Age	39.04 (2.49)$_b$	48.79 (2.62)$_a$	37.80 (2.56)$_b$	5.38**
Female	71.43%	52.63%	60.00%	1.52
Years education	15.38 (2.22)	14.56 (2.58)	14.67 (1.68)	.77
Ethnicity (n)				
Asian-American	0	0	6	
Caucasian	18	18	10	
Latino/a	0	0	3	
African-American	2	1	0	
Other	1	0	1	
No. of comorbidities	.90 (1.14)$_a$	.16 (37)$_b$	.00 (.00)$_c$	21.69***
BDI	9.43 (6.62)$_a$	7.64 (5.11)$_a$	3.10 (3.25)$_b$	7.86***
BAI	8.86 (6.23)$_a$	4.21 (3.37)$_b$	1.30 (3.01)$_c$	15.41***

Note: BP = bipolar I group; INS = primary insomnia group; NC = non-clinical group; BDI = Beck Depression Inventory; BAI = Beck Anxiety Inventory. Data are expressed as mean (SD). Subscripts denote significant differences.
**$p < .01$; ***$p < .001$.

As evident in Table 1, the BP group exhibited a greater number of current comorbidities than the INS group, $F(1, 38) = 21.69$, $p < .001$. Furthermore, while none of the participants were clinically depressed, participants in the BP and INS groups reported significantly higher levels of depressive symptoms compared to the NC group $F(2, 59) = 7.86$, $p < .001$. INS and BP groups did not significantly differ from each other in the severity of their depressive symptoms ($p > .10$). Participants in the BP and INS group also reported significantly higher levels of anxiety than the NC group, $F(2, 59) = 15.41$, $p < .001$, and participants in the BP group reported higher levels of anxiety than the INS group ($p < .05$).

Overview of primary analyses

Given that the distribution of our univariate variables mirrored a normal distribution, we did not transform variables before conducting analyses. Four univariate ANCOVAs were conducted for rumination, worry, depressive thoughts, and anxious thoughts with age included as the covariate. Post-hoc analyses with a Bonferroni correction were performed to examine the source of group differences.

We first conducted bivariate correlations to examine the inter-correlations between our primary outcome measures (rumination, worry, and negative automatic thoughts). Not surprisingly, we found significant positive inter-correlations between all measures. Rumination was positively correlated with worry ($r = .62$), depressive ($r = .44$), and anxious ($r = .49$) automatic thoughts. Worry was also positively correlated with depressive ($r = .48$), and anxious ($r = .50$) automatic thoughts. Depressive and anxious automatic thoughts were positively correlated with each other ($r = .74$) (all $ps < .001$). These inter-correlations are consistent with prior research among individuals with major depression and generalized anxiety disorder (e.g., Sergestrom et al., 2000).

Differences in three candidate transdiagnostic processes

As is evident in Table 2, the three groups differed in global rumination (on the GRS), $F(2, 56) = 5.33$, $p < .01$ and worry (on the

Table 2
Group differences on three candidate transdiagnostic emotion regulation processes

	BP ($n = 21$)	INS ($n = 19$)	NC ($n = 20$)	F
GRS	52.10 (10.32)$_a$	47.00 (8.12)$_a$	43.95 (9.64)$_b$	5.33**
PSWQ	49.71 (14.71)$_a$	47.89 (13.96)$_a$	39.60 (14.76)$_b$	4.67*
CCL-Depressive Subscale	9.81 (9.58)$_a$	6.91 (4.15)$_{a,b}$	3.75 (6.00)$_b$	3.70*
CCL-Anxious Subscale	8.62 (8.92)$_a$	4.85 (4.36)$_{a,b}$	2.90 (5.27)$_b$	4.08*

Note: BP = bipolar I group; INS = primary insomnia group; NC = non-clinical group; GRS = Global Rumination Scale; PSWQ = Penn State Worry Questionnaire; CCL = Cognitions Checklist. Data are reported with age as a covariate and are expressed as mean (SD). Subscripts denote significant differences.
*$p < .05$; **$p < .01$.

PSWQ), $F(2, 56) = 4.67$, $p < .05$. Post-hoc comparisons revealed that both the BP and INS groups reported more rumination and worry than the NC group ($ps < .05$). The BP and INS groups did not differ from one another in global rumination or worry ($ps > .10$).

Participants also differed in the degree of depressive, $F(2, 59) = 3.70$, $p < .05$, and anxious, $F(2, 5) = 4.08$, $p < .05$, negative automatic thoughts. Post-hoc analyses indicate that the BP group reported more negative automatic thoughts than the NC group. However, the INS group did not differ from the NC group in negative automatic thoughts. The BP and INS groups did not differ from one another in negative automatic thoughts.

Examination of potential confounds

Given that comorbid insomnia in several of the BP participants ($n = 5$) could account for these findings, analyses were repeated excluding these participants. The results were identical to those reported above. We also examined whether current symptoms of depression and anxiety influenced the results. After controlling for current symptoms, the three groups no longer significantly differed in rumination, $F(1, 59) = .70$, $p = .50$, worry, $F(1, 59) = .64$, $p = .53$, anxious automatic thoughts, $F(1, 59) = .17$, $p = .84$, and depressive automatic thoughts, $F(1, 59) = .13$, $p = .88$.

Discussion

The aim of the present study was to examine whether three processes involved in the regulation of emotion – rumination, worry, and negative automatic thoughts – were evident across bipolar disorder and insomnia. Prior to controlling for current symptoms of anxiety and depression, the results were consistent with the hypothesis that rumination and worry are transdiagnostic; that is, individuals with bipolar disorder or insomnia exhibited them to a greater degree than healthy controls. With respect to negative automatic thoughts, the BP group had more negative automatic thoughts than the NC group, but the BP group did not differ from the INS group and the INS group did not differ from the NC group. Though this finding does not support a transdiagnostic perspective per se (i.e., that a process is present to a significant degree in two disorders while being significantly less present in healthy controls), the finding is consistent with the assertion that negative automatic thoughts are not disorder specific.

Interestingly, this pattern of results was no longer evident when current symptoms of depression and anxiety were controlled for. One interpretation of this result is that it weakens the transdiagnostic argument. However, we proposed several reasons that these findings are newsworthy and relevant to a transdiagnostic perspective. First, if cognitive processes are causally contributing to symptoms of psychopathology, partialing out the contributions anxiety and depression symptoms may dampen our ability to detect the transdiagnostic processes. Second, these findings are consistent with previous work suggesting that current depressive and anxious symptoms are associated with negative cognition (Alloy, Reilly-Harrington, Fresco, Whitehouse, & Zechmeister, 1999) and rumination (Johnson, McKenzie, & McMurrich, in press; Thomas & Bentall, 2002) in bipolar disorder. Third, the association of current symptoms with rumination and worry in insomnia is a novel finding that is consistent with previous work suggesting that insomnia, anxiety, and depression are bidirectionally interrelated (e.g., Harvey, Hairston, Gruber, & Gershon, in press). One must be cautious in interpreting these findings, however, as controlling for current symptoms to minimize between-group variability violates important statistical assumptions (Miller & Chapman, 2001).

The results of the present study need to be interpreted within the confines of several limitations. First, the insomnia group significantly differed from the bipolar and control groups along several demographic and clinical variables, including age and geographic location. Difference in recruitment location also raises the possible limitation that the results may have been influenced by cultural differences between the UK and US. Future studies should ensure that groups are as matched as possible on all such demographics. The two groups were also not matched on the presence of comorbid Axis I disorders. Although this may represent a more ecologically valid sample, it leaves unclear whether the presence of comorbid disorders might account for some of the similarities between groups. Second, our conclusions are made on the basis of a fairly small sample and should be replicated in a larger sample. Third, our sample was ethnically homogeneous and thus unclear whether the current results are generalizable across different ethnic groups. Fourth, the candidate transdiagnostic processes were assessed exclusively with self-report questionnaires. While self-report studies are a worthwhile first step, future studies should utilize experimental inductions of worry (Borkovec et al., 1998) and rumination. Future research should examine recent advances in the conceptualization of rumination that include reflective and brooding subtypes (Nolen-Hoeksema & Morrow, 1991) to examine whether more fine-grained aspects of rumination are transdiagnostic. Future studies should endeavor to determine if these variables exert an influence on the results. Fifth, consistent with previous research our primary outcome measures were positively correlated with each other. It will be important for future studies to explore the differences and similarities between worry, rumination, and negative automatic thoughts in insomnia and bipolar samples. Additionally, it will be important to investigate whether worry, rumination, and negative automatic thoughts are state or trait characteristics.

In summary, the present study adds to the small but growing literature supporting a transdiagnostic approach to psychopathology (Barlow et al., 2004; Fairburn et al., 2003; Harvey et al., 2004; Hayes et al., 1996). Specifically, the present study demonstrated the presence of two cognitive factors – worry and rumination – related to maladaptive emotional processing in two seemingly different diagnostic groups. When we controlled for current symptoms these two processes no longer characterized BP and INS participants, suggesting that these disorders may share comorbid anxiety and depressive symptoms contributing to the presence of shared transdiagnostic processes. Such studies are important first steps toward learning about shared and unique psychological processes in psychopathology. Critical next steps include showing that the processes contribute to the etiology or maintenance of the disorders in question. Hence, prospective and experimental studies in which the proposed transdiagnostic processes are measured and activated or deactivated will be required for the completion of this next step. If worry and rumination continue to be found across disorders, and prospective and experimental studies establish they play a causal role, it is possible that treatment may be improved by

developing modules to target these psychological processes and applying them across disorders.

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