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Positive emotion dysregulation across mood disorders: How amplifying versus dampening predicts emotional reactivity and illness course



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ABSTRACT

Maladaptive regulation of positive emotion has increasingly been associated with psychopathology. Little is known, however, about how individual strategies used to manage positive emotion predict concurrent emotional responding and prospective illness course across mood disorders. The present study examined the concurrent and prospective influence of amplification and dampening regulation strategies of positive emotion (i.e., self-focused positive rumination, emotion-focused positive rumination, and dampening) among remitted individuals with bipolar I disorder (BD; $n = 31$) and major depressive disorder (MDD; $n = 31$). Rumination over positive emotional states concurrently predicted increased positive emotion across both mood disordered groups during an experimental rumination induction. However, dampening positive emotion concurrently predicted increased emotional reactivity (i.e., heart rate and negative affect) and prospective increases in manic and depressive symptoms for the BD group only. This suggests that amplifying positive emotion transdiagnostically increases positive emotion across mood disordered groups, while attempts to dampen positive emotion may paradoxically exacerbate emotional reactivity and illness course in BD. For individuals with BD, negative thinking about one's positive emotion (via dampening) may be particularly maladaptive.

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The strategies people use to regulate their emotions, and in particular, negative emotions, appear to be strongly linked to psychopathology (e.g., Aldao, Nolen-Hoeksema, & Schweizer, 2010). Recently, research has also suggested that dysfunctional regulation of positive emotion may play an important role in mood disorders (Gilbert, 2012; Gruber, 2011). There are many ways an individual can respond to a positive emotional state, and one response is to *ruminate* on it (often referred to as 'positive rumination'). Ruminating in a positive emotional state is defined as the tendency to respond to the positive state with recurrent thoughts of one's positive emotional state and positive self-qualities (Feldman, Joormann, & Johnson, 2008). Rumination in the context of a positive emotional state theoretically increases the intensity of, or amplifies, positive emotion (Feldman et al., 2008), much as negative rumination amplifies negative emotion (see Nolen-Hoeksema, Wisco, & Lyubomirsky, 2008). Another form of responding to positive emotion is by *dampening* it, defined as actively decreasing positive feelings by ruminating on the negative aspects of the

positive emotional state (Feldman et al., 2008). Dampening is a form of responding to positive emotion that theoretically works to decrease the intensity of positive emotions.

Research is beginning to examine correlates of both amplifying (i.e., ruminating) and dampening positive emotional states. However, there is little understanding of how tendencies to use these strategies are associated with emotional responding while actively engaging in rumination. Moreover, no studies with clinical populations have explored how these responses to positive emotion predict clinical course in disorders characterized by dysregulated positive emotion, such as bipolar disorder (BD) and depression (MDD) (Bylsma, Morris, & Rottenberg, 2008; Gruber, 2011). The current study was designed to address these research gaps.

Rumination on positive emotion is one form of positive emotion amplification, and is most commonly measured using a self-report questionnaire titled the Responses to Positive Affect (RPA; Feldman et al., 2008). The RPA assesses two subtypes of ruminating in positive emotional states, including emotion-focused rumination, characterized by repetitively focusing thoughts on a current positive emotional state, and self-focused rumination, or repetitively focusing on positive self-qualities. Positive rumination is elevated in BD, a disorder characterized by heightened positive moods and

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biases towards positive emotional responding (Gruber, Eidelman, Johnson, Smith, & Harvey, 2011; Johnson, McKenzie, & McMurrich, 2008). Individuals with BD engage in more emotion-focused positive rumination compared with healthy controls and individuals with unipolar depression (Johnson et al., 2008). Moreover, greater emotion-focused and self-focused positive rumination is associated with elevated concurrent hypomanic/manic symptoms (Feldman et al., 2008) and increased lifetime history of mania and depression frequency in BD (Feldman et al., 2008; Gruber et al., 2011). Emotion-focused and self-focused positive rumination are also cross-sectionally associated with increased manic symptoms following a positive mood induction (Edge et al., 2012).

Another method of responding to positive emotion assessed by the RPA is to dampen it. Dampening at first glance may appear to imply suppression of positive emotion. However, dampening is instead a negative reflection on and active dismissal of one's current positive emotional state (i.e., when in a positive emotional state, "think I don't deserve this"; Feldman et al., 2008). Individuals with BD and those at risk for developing BD endorse utilizing more dampening of positive emotion than healthy controls, and dampening is associated with elevated current depressive symptom severity in at-risk and BD groups (Feldman et al., 2008; Johnson et al., 2008). Dampening is also associated with current and prospective onset of depressive symptoms in non-clinical community samples (Bijttebier, Raes, Vasey, & Feldman, 2011; Raes, Smets, Nelis, & Schoofs, 2012).

The present investigation

Taken together, two domains of positive emotion regulation—amplification (positive rumination) and dampening—have been associated with increased current manic and depressive symptoms in both clinical and non-clinical populations. However, it is unknown how tendencies to ruminate or dampen positive emotion influence emotional responding while ruminating or the prospective relationship of ruminating and dampening positive emotion on illness course across two severe mood disordered groups. The current study addressed these aims.

Aim 1: concurrent associations with emotional responding

Given the burgeoning literature on positive emotion regulation, it is critical to understand how self-reported rumination and dampening relate to emotional responding when actively engaging in rumination. Thus, our first aim examined the specificity of relationships between rumination and dampening with emotional responding and participants included individuals with BD and MDD, both of whom are characterized by dysregulated positive emotion. Participants were induced to ruminate on a future goal in a laboratory task and their emotional and physiological responses were assessed. Both BD and MDD are characterized by goal-dysregulation: individuals with BD experience hyperactive goal pursuit (Johnson, 2005) while individuals with MDD display a lack of goal pursuit (Dickson & MacLeod, 2004). Moreover, thinking about goals can activate both negative and/or positive emotional reactions (Carver & Scheier, 1998). Thus, having participants ruminate in the context of a personalized goal allowed individuals' negative and/or positive emotions and trait tendencies to amplify or dampen these emotions to emerge naturally in an ecologically salient induction.

Given that rumination on positive emotions theoretically amplifies positive emotion (Feldman et al., 2008) and increases manic symptoms when individuals with BD are induced into a positive mood (Edge et al., 2012), we hypothesized that across mood disordered groups, elevated emotion-focused and self-focused

rumination would be associated with increased self-reported positive emotion following the goal-primed rumination induction. Conversely, dampening purportedly decreases positive emotion via ruminating on the negative aspects of the positive state and is associated with increased depressive symptoms in non-clinical and BD groups (Feldman et al., 2008; Johnson et al., 2008; Raes et al., 2012). Thus, we hypothesized that across mood disordered groups, dampening positive emotions would result in elevated negative emotional reactivity and arousal after ruminating on one's future goal. We measured emotional arousal using a multi-method approach of self-reported negative emotion and heart rate (HR), a robust and widely used physiological measure of emotional reactivity (Kreibig, 2010). Increases in HR purportedly reflect more than just task engagement (Levenson, 2003) and increases in HR are uniquely associated with ruminative processing of positive emotional material compared to other forms of equally cognitively taxing regulation strategies, such as third-person reflection (Gruber, Harvey, & Johnson, 2009).

Aim 2: prospective associations with illness course

Ruminating and dampening positive emotion have repeatedly been associated with elevated current symptoms, yet the only prospective research has studied non-clinical populations. It is thus imperative to understand how rumination and dampening predict the onset of symptoms in a mood-disordered population. Our second aim was to report the prospective relationships between self-reported amplification and dampening and symptom severity in individuals with BD and MDD. Given that emotion and self-focused positive rumination are associated with current manic symptoms while dampening is associated with current depressive symptoms in BD (Feldman et al., 2008; Johnson et al., 2008), we hypothesized that emotion and self-focused positive rumination would predict the onset of manic symptoms and dampening would predict the onset of depressive symptoms only in the BD group. We did not hypothesize any relationships between the self- or emotion-focused positive rumination subscales in the MDD group as positive rumination has not been previously implicated in unipolar depression (Johnson et al., 2008). However, we hypothesized that dampening would prospectively predict the onset of depressive symptoms in the MDD group given that dampening predicts increased depressive symptoms in non-clinical samples (Raes et al., 2012).

Method

Participants

Participants were 31 persons diagnosed with BD type I (currently remitted) and 31 persons diagnosed with MDD (currently remitted) recruited from online postings and flyers distributed in the New Haven, CT region. We focused on remitted mood disordered groups to examine the influence of rumination on concurrent emotional responding independent of mood phase, and also to examine prospective symptom exacerbation starting from a relatively low symptom baseline to follow-up. Exclusion criteria included history of head trauma, stroke, neurological disease, autoimmune disorder, cardiovascular disease or arrhythmia, and alcohol or substance abuse/dependence in the past six months. Diagnoses were confirmed using the Structured Clinical Interview for DSM-IV Patient Version (SCID-IV; First, Spitzer, Gibbon, & Williams, 2007) administered by trained researchers. Half ($n = 29$) of interviews were independently assessed by trained researchers and ratings matched 100% ($\kappa = 1.0$). Current remitted mood status was verified with the SCID-IV mood module for the

past month, and clinician-rated symptom cutoffs in the past week for manic symptoms using the Bech–Rafaelsen Mania Scale (BRMS; cut off score ≤ 15 ; [Bech, Bolwig, Kramp, & Rafaelsen, 1979](#)) and depression symptoms using the Inventory of Depressive Symptomatology (IDS-C; cut off score ≤ 11 ; [Rush, Gullion, Basco, Jarrett, & Trivedi, 1996](#)).

Procedure

The present study consisted of a baseline laboratory session and prospective six-month follow-up assessment as part of a larger protocol on emotion. The baseline session started with SCID-IV, BRMS and IDS-C administration and completion of self-reported RPA scale. Next, using computerized software (MediaLab v2008, MediaLab, Inc., Atlanta, GA), participants were instructed to clear their minds and rest quietly for 90 s to measure baseline heart rate followed immediately by assessment of baseline subjective negative and positive affect. Next, participants were instructed to think about and visualize a future goal with the following instructions: “I will now ask you to imagine something that you have dreamed of pursuing. That is, something you would like to, or hope to, achieve one day. Please take a few moments right now to think about things you have really wanted to pursue or aim to achieve. As you think about these future goals, try to identify one that is clear in your mind that you would feel motivated to pursue and accomplish. This goal can be large or small, easy or difficult. It might be something you could pursue as soon as tomorrow, or, something you dream of pursuing in another life.” Participants were given 90s to visualize their goal. Following the prime of a future goal, participants then completed a validated valence-neutral rumination manipulation ([Lyubomirsky & Nolen-Hoeksema, 1993](#)) including presentation of prompts including, “think about why you react the way you do?” and “think about your level of motivation right now.” Participants were told to spend as long as they wanted on each prompt going through as many prompts as they desired for 300 s. Concurrent heart rate and self-reported emotion were obtained during the task. A follow-up clinical assessment was conducted approximately six months later ($M = 200.07$ days, $SD = 23.10$) in which participants completed measures of self-reported manic and depressive symptoms using an anonymous online Qualtrics survey.

Measures

Laboratory session measures

Positive rumination and dampening. Positive rumination and dampening were assessed using the Responses to Positive Affect (RPA; [Feldman et al., 2008](#)). The RPA is a 17-item self-report measure rated on a 1 (*almost never respond in this way*) to 4 (*almost always respond in this way*) scale. The RPA has three subscales, including Emotion-focused positive rumination (e.g., “Think about how happy you feel”), Self-focused positive rumination (e.g., “Think about how proud you are of yourself”) and Dampening (e.g., “Think about things that could go wrong”). Good internal consistency was obtained for all subscales ($\alpha = 0.82, 0.79, 0.83$ for Emotion-focused, Self-focused, and Dampening, respectively).

Mood symptoms. Baseline symptoms of mania were measured using the BRMS, an 11-item clinician-rated interview-based measure of current manic symptoms. Scores range from 0 to 44 with scores ≥ 15 representing moderate to severe manic symptom levels. Baseline symptoms of depression were measured using the interview-based IDS-C. The IDS-C is a 30-item measure of depressive symptom severity ranging from 0 to 84, with scores ≥ 11 representing clinically significant symptoms. Intra-class correlation coefficients ([Shrout & Fleiss, 1979](#)) between the original rater and

an independent coder were high for the BRMS (ICC = 0.91) and IDS-C (ICC = 0.93).

Emotion responding. At baseline and immediately following the rumination task, participants completed the 10-item short form of Positive and Negative Affect Schedule (PANAS; [Watson, Clark, & Tellegen, 1988](#)) on a 1 (*very slightly*) to 5 (*extremely*) scale. Positive affect (PA; $\alpha_{\text{mean}} = 0.76$) and negative affect (NA; $\alpha_{\text{mean}} = 0.83$) composites demonstrated good internal consistency. Heart rate was recorded continuously throughout the baseline and rumination task at 1,000 Hz using a Mindware BioNex 50-3711-08 device (Mindware Technologies, Gahanna, OH). ECG recordings were obtained with two pre-jelled Ag–AgCl snap disposable vinyl electrodes placed in a modified Lead II configuration. A MindWare ECG amplifier, using a bandpass filter of 0.5 Hz–100 Hz (and a 60 Hz notch filter), was used and the ECG signal was converted to R-wave intervals, which were converted to beats per minute. Artifacts and recording errors were corrected offline and values ± 3.0 standard deviations were Winsorized (<3% of all data).

Follow-up prospective symptom measures

Mood symptoms

The Mood Disorders Questionnaire (MDQ; [Hirschfeld et al, 2000](#)) assessed symptoms of mania at follow-up. The MDQ is a 13-item yes/no self-report that assesses the number of DSM-IV criteria of mania met by the respondent over the past six months; all items preceded by the phrase, “Has there ever been a period of time in the past six months when you were not your usual self and...”. Scores ≥ 7 meet criteria for a bipolar spectrum disorder ([Hirschfeld et al, 2000](#)). The Inventory to Diagnose Depression-Lifetime (IDD-L; [Zimmerman & Coryell, 1987](#)) is a 4 point scale self-report (0 = *no disturbance*; 1 = *subclinical severity*; 2–4 = *varying levels of symptom presence*) that assessed the most severe depressive symptoms experienced over the preceding six months. To capture both syndromal and subsyndromal mood symptoms, we focused on IDD-L continuous symptom scores by using the 9 symptom severity items that assess DSM-IV criteria of depression (≥ 10 indicates clinically significant symptoms).

Results

Preliminary analyses

No group differences emerged for baseline mood symptoms, RPA subscales, demographic characteristics (see [Table 1](#)) or for baseline NA, PA, or HR or following the rumination induction (p 's > 0.05 ; see [Table 2](#)). Using repeated measures ANOVA to assess the effects of the rumination manipulation on NA, PA, and HR, we found main effects of Time for NA, $F(1,55) = 10.78, p = 0.002$, PA, $F(1,58) = 15.61, p < 0.001$, and HR $F(1,54) = 4.38, p = 0.04$, but no Group main effects or Mood \times Group interaction.¹ These findings indicate that, as expected, the induction increased negative and positive affect and cardiovascular arousal across mood disordered groups and thus allowed us to continue our investigation on how individual self-reported tendencies might have influenced responding. There was good retention at the six-month follow-up (BD = 22, 71%; MDD = 24, 77%), and those who completed the follow-up did not differ from those who did not on any demographic variables,

¹ Detailed procedures for and expanded analyses in response to the goal visualization are under review as: Gilbert K.E. & Gruber J. (*under review*). Emotion regulation and goals in bipolar disorder and major depression: A comparison of rumination and mindfulness.

Table 1
Demographic, clinical, & trait rumination & dampening group differences between remitted bipolar I disorder and remitted depressed groups.

	BD (n = 31)	MDD (n = 31)	Statistic
Demographics			
Age	30.90 (9.76)	31.71 (11.15)	$t = 0.30$
Yrs education	14.98 (2.18)	15.16 (2.27)	$t = 0.31$
Gender (% F)	64%	68%	$t = 0.07$
Ethnicity (% white)	90%	90%	$\chi^2 = 4.00$
Employment (% employed)	45%	52%	$t = 1.26$
Clinical characteristics			
IDS-C at baseline	4.26 (3.31)	5.13 (2.70)	$t = 1.13$
BRMS at baseline	1.90 (1.68)	1.70 (2.05)	$t = 0.43$
Illness duration (months)	154.52 (126.63)	180.77 (125.58)	$t = -0.81$
Total depressive episodes	14.52 (23.61)	5.55 (7.46)	$t = 1.96$
Total manic episodes	9.40 (17.47)	–	
Months since last episode	23.84 (52.38)	45.19 (53.39)	$t = -1.59$
# Comorbid disorders	0.55 (0.93)	0.70 (0.99)	$t = -0.62$
Trait rumination & dampening			
RPA-emotion	14.26 (3.66)	13.29 (3.57)	$t = 1.63$
RPA-self	10.29 (3.39)	9.16 (3.06)	$t = 1.41$
RPA-dampening	15.48 (5.51)	13.16 (3.60)	$t = 1.96$
Baseline emotion			
HR	72.60 (11.22)	71.67 (7.91)	$t = -0.36$
NA	9.10 (2.14)	9.27 (2.61)	$t = -0.27$
PA	11.73 (4.48)	11.93 (3.53)	$t = -0.19$
Mood symptoms at 6-mo follow up			
MDQ total	4.50 (4.71)	2.83 (3.21)	$t = 1.45$
IDD-L total	2.45 (2.58)	1.75 (2.25)	$t = 0.99$

Note: Mean values are displayed with standard deviations in parentheses where applicable. BD = Remitted Bipolar participants; MDD = Remitted Depressed participants; IDS-C=Inventory of Depressive Symptomatology; BRMS = Bech-Rafaelsen Mania Scale; # Medications = The number of psychotropic medications currently taken, including anticonvulsants, lithium, neuroleptics, anxiolytics, stimulants, antidepressants, and sedative-hypnotics; # Comorbid Disorders = the number of current DSM-IV-TR Axis I comorbidities, including panic disorder, agoraphobia, social phobia, specific phobia, obsessive-compulsive disorder, generalized anxiety disorder, hypochondriasis, body dysmorphic disorder, binge-eating disorder, and bulimia; RPA = Responses to Positive Affect; HR = Heart Rate; NA = Subjective Negative Affect; PA = Subjective Positive Affect; MDQ = Mood Disorders Questionnaire (measure of manic symptoms); IDD-L = Inventory to Diagnose Depression, Lifetime Version (measure of depressive symptoms). * $p < 0.05$.

baseline manic symptoms, or positive rumination RPA scores (p 's > 0.05). However, completers ($M = 12.40$, $SD = 3.84$) scored lower on RPA dampening compared to non-completers ($M = 16.05$, $SD = 5.35$), $t(93) = 2.98$, $p = 0.004$; and lower on baseline depressive symptoms ($M = 3.35$, $SD = 2.72$) compared to non-completers ($M = 6.09$, $SD = 5.32$), $t(25.68) = 2.38$, $p = 0.03$.

Aim 1: concurrent associations with RPA and emotional responding

We hypothesized that RPA self-focused and emotion-focused rumination would be associated with increased PA and dampening would be associated with increased HR and NA across mood disordered groups during the experimental rumination induction. To test this hypothesis, Pearson's correlations were performed within each diagnostic group for RPA subscales and PA, NA, and HR from the rumination task (see Table 3). For the BD group, emotion-

Table 2
Emotion measures from baseline to experimental rumination task within remitted bipolar and remitted depressed participants.

Emotion measure	BD		MDD	
	Baseline	Rumination	Baseline	Rumination
HR	72.59 (11.22)	74.40 (10.46)	71.67 (7.91)	72.10 (8.42)
NA	9.10 (2.14)	10.36 (3.92)	9.28 (2.61)	10.62 (3.49)
PA	11.73 (4.48)	12.83 (5.45)	11.93 (3.53)	14.30 (5.30)

Note: BD = Bipolar participants; MDD = Remitted Depressed participants; HR = Heart Rate; NA = Subjective Negative Affect; PA = Subjective Positive Affect. * $p < 0.05$.

focused rumination was associated with elevated PA ($p = 0.03$) and self-focused rumination showed trend associations ($p = 0.06$) while dampening was associated with elevated HR ($p = 0.05$) and NA ($p = 0.01$). For the MDD group, emotion ($p = 0.04$) and self-focused ($p = 0.02$) rumination were associated with increased PA, but dampening was not associated with HR ($p = 0.37$) or NA ($p = 0.98$). To test whether the strength of the correlations between RPA subscales and emotion responding significantly differed between the BD and MDD groups, we performed Fisher r -to- z transformations (Meng, Rosenthal, & Rubin, 1992). Results did not suggest significant differences in the strength of these correlations for any of the variables, although the relationship between dampening and NA trended towards being significantly different in the BD group, $Z = -0.96$, $p = 0.07$.

Aim 2: prospective associations with illness course

To assess the hypothesis that RPA self-focused and emotion-focused rumination scores would predict elevated manic symptoms in the BD group, we examined partial correlations between RPA subscale scores and MDQ scores at the six-month follow-up while controlling for baseline manic symptoms. To assess the hypothesis that dampening would predict elevated depressive symptoms across mood disordered groups, we examined partial correlations between the RPA subscale scores and IDD-L scores at follow-up, controlling for baseline depressive symptoms (see Table 3). In the BD group, dampening predicted elevated manic symptoms ($p = 0.002$) and depressive symptoms ($p = 0.01$). In the MDD group, self-focused positive rumination predicted elevated manic symptoms ($p = 0.01$). Fisher r -to- z transformations were employed to test whether the strength of these correlations significantly differed between mood disordered groups (Meng et al., 1992). Results indicated the relationship of dampening to manic, $Z = 2.51$, $p = 0.01$ and depressive $Z = 2.52$, $p = 0.01$ symptoms was significantly different across groups yet there were no group differences in self-focused or emotion-focused positive rumination and symptoms.

Discussion

The pattern of results in the present study suggest that positive rumination and dampening are differentially implicated in BD and MDD, which we discuss separately below.

Table 3

Correlations of trait positive rumination and dampening with experiential rumination induction emotion indices and six month follow up clinical symptoms within remitted bipolar and remitted depressed participants.

	Rumination task			6 Month follow up symptoms	
	HR	NA	PA	MDQ total	IDD-L total
BD					
RPA emotion	-0.02	0.03	0.41*	0.15	-0.03
RPA self	0.22	0.15	0.38†	0.24	-0.27
RPA dampen	0.38*	0.47*	0.21	0.65**	0.53*
MDD					
RPA emotion	-0.30	0.08	0.38*	0.18	0.01
RPA self	-0.23	0.01	0.44*	0.52*	-0.13
RPA dampen	0.17	0.00	-0.25	-0.11	-0.28

Note: Six month follow up correlations are partial correlations controlling for baseline manic symptoms (BRMS) when assessing MDQ symptoms or baseline depressive symptoms (IDS-C) when assessing IDD-L symptoms. BD = Bipolar participants; MDD = Remitted Depressed participants; RPA = Responses to Positive Affect; HR = Heart Rate; NA = Subjective Negative Affect; PA = Subjective Positive Affect; MDQ = Mood Disorders Questionnaire; IDD-L = Inventory to Diagnose Depression, Lifetime. * $p < 0.05$, ** $p < 0.01$, † $p < 0.10$.

Concurrent and prospective associations in BD

Within the BD sample, emotion-focused rumination was correlated with increased PA when ruminating in the context of a goal. This result is consistent with prior research finding that emotion-focused positive rumination is associated with a history of mania (Johnson et al., 2008), ruminating in positive emotional states increases manic symptoms (Edge et al., 2012) and supports the theoretical argument that ruminating in a positive state increases positive emotional responding in individuals with BD (Feldman et al., 2008). The elevated positive emotion activated when ruminating may activate positive emotional biases evident in BD in an upwards spiraling direction towards mania (e.g., Gruber, 2011). However, given that ruminating on positive emotion did not predict increased clinical symptoms within the BD group six months later, further investigation of the direct influence of this emotional amplification in BD is warranted.

As hypothesized, dampening was related to both emotional responding while ruminating and prospective symptom onset within the BD group. Self-reported dampening in the BD sample was associated with momentary increases in subjective and physiological negative emotional arousal, although these correlations did not significantly differ from those in the MDD group. Dampening of positive emotion did not influence positive emotional responding, but rather, increased negative emotion and heart rate, demonstrating how negative interpretations of one's positive emotion might elicit general emotional distress. Higher dampening also predicted the onset of both manic and depressive symptoms over the course of six months only in the BD group. Dampening appears to be an ineffective strategy to regulate positive emotion exacerbates emotional distress while ruminating and leads to longer term consequences of an overall worsened clinical course and mixed symptom states. However, further investigation of how dampening activates mixed episodes is warranted.

The findings that dampening positive emotion lead to increased manic symptoms in the BD group underscores that negatively appraising positive emotion may in fact paradoxically intensify these states. This is an important point given that prevailing models highlight processes aimed at the amplification of positive mood and related reward-seeking cognitions in the etiology of mania (see Alloy & Abramson, 2010; Healy & Williams, 1989; Johnson, 2005; Jones, 2001). Although positive biases might provide one avenue by which mania onsets, our findings point to the added importance of dampening positive mood and related negative cognitive styles in influencing mania. Indeed, empirical evidence demonstrates that individuals with BD are characterized by both positive and negative appraisals of activated internal states (Kelly et al., 2011; Mansell, Morrison, Reid, Lowens, & Tai, 2007) and negative appraisals of positive internal states are what differentiate BD from an MDD and non-clinical group (Kelly et al., 2011). Given this recent work, our findings might indicate that individuals with BD struggle with effectively accepting and regulating their positive emotions, utilizing a host maladaptive strategies including amplifying, dampening, and dysfunctionally appraising positive states, which combined, predict increased manic symptoms. Future work should continue to examine the mechanisms by which negative perceptions of one's positive emotions leads to mania.

Concurrent and prospective associations in MDD

In the participants with a history of MDD, tendencies to engage in self-focused and emotion-focused rumination were associated with elevated positive emotion during the rumination

induction. Although self-reported rumination on positive emotion has not previously been associated with MDD (Johnson et al., 2008), ruminating on positive emotion may allow individuals with MDD to maintain and potentially increase positive emotions in the moment. Savoring positive emotion is an adaptive way to maintain positive emotion (Bryant, 2003), and similarly, ruminating on positive emotions and self-qualities may be adaptive for individuals with a history of MDD to counter otherwise blunted and restricted positive emotion (Bylsma et al., 2008). Interestingly, higher self-focused positive rumination also predicted elevated subsyndromal manic features. However, the range of manic symptoms in this group was restricted and this correlation did not significantly differ from the BD group, so it is possible the finding might be spurious or simply identifying increased positive mood states in the remitted depressed sample. Future research should determine whether positive rumination may adaptively increase positive emotion or contribute to elevated manic symptoms in MDD.

Conclusions and limitations

Four limitations of the current study should be noted. First, our sample size was small and not all participants could be contacted for follow-up. Moreover, the non-completers of the follow-up had higher baseline depressive symptoms and dampening scores. Although confounding factors, this might indicate that the non-completers are, in fact, a more severe clinical population that might have experienced more severe symptom presentations at follow-up. Second, we used a novel rumination induction that primed a future goal. We did this to examine a form of rumination that might activate negative and/or positive emotional responding in individuals who experience goal dysregulation. Future research should nonetheless examine experimental manipulations that induce a specific negative or positive ruminative or dampening state to confirm our findings. Third, we did not assess emotional responding following the goal-induction prior to ruminating. We did this to not interrupt the goal visualization, however, this did not allow us to tease apart how the rumination induction independently influenced emotional responding. Fourth, manic and depressive symptoms were measured differently at baseline and follow-up. Although Fisher's *r*-to-*z* transformations indicated significant group differences in the prospective effects of dampening, future research would benefit by using repeated measures of parallel symptom scales.

The current study provides initial support for the idea that tendencies to amplify and dampen positive emotion are associated with emotional responding when ruminating and predict clinical symptoms across mood disordered groups. Tendencies to ruminate on positive emotions and self-qualities amplify positive emotion across mood disordered groups when ruminating. Clinically, ruminating on positive states may be akin to savoring techniques by momentarily increasing and maintaining positive emotion. Additionally, dampening appears to have unique associations with emotional dysregulation and symptom onset in BD. Targeted psychosocial treatments for BD should especially focus on amelioration of maladaptive schemas about positive mood states and fostering more acceptance-based forms of positive emotion regulation such as mindfulness-based approaches.

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