



Reflective and ruminative processing of positive emotional memories in bipolar disorder and healthy controls

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ARTICLE INFO

Article history:

Received 11 January 2009

Received in revised form

8 May 2009

Accepted 19 May 2009

Keywords:

Positive emotion

Imagery

Distanced-Why

Rumination

Reflective processing

Bipolar disorder

ABSTRACT

Recent evidence suggests that reflective (i.e., distanced-why), as compared to ruminative (i.e., immersed-why), processing of negative memories is associated with reductions in negative affect. The present study extended this line of work by examining the effect of these two processing conditions on positive memories among persons with bipolar disorder (BD; $n = 27$) and a healthy control group (CT; $n = 27$). After a resting baseline period, participants were instructed to recall a happy autobiographical memory. Using a within-subjects design, participants were asked to process the happy memory in two different experimental conditions (reflective, ruminative) while their experiential, behavioral, and autonomic responses were measured. Consistent with hypotheses, reflective processing was associated with lower self-reported positive affect, positive thoughts, and heart rate compared to ruminative processing for all participants. When current symptoms were controlled for, BD participants reported greater positive affect across both conditions relative to CT participants. Prospective studies are needed to test the extent to which processing of positive emotion contributes to the course of symptoms in bipolar disorder.

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Bipolar disorder is a severe and chronic psychiatric illness associated with profound functional impairment, morbidity, and mortality (Coryell et al., 1993). One of the cardinal symptoms of bipolar disorder includes disturbances in positive emotion, including an abnormally and persistently elevated mood (American Psychiatric Association, 2000). Experimental evidence indicates that bipolar disorder is associated with elevated reactivity to positive stimuli. At risk (defined using the Hypomanic Personality Scale; Eckblad & Chapman, 1986) and diagnosed bipolar disorder samples report greater positive feelings at the prospect of earning rewards compared to healthy controls (Johnson, Ruggero, & Carver, 2005; Meyer, Johnson, & Winters, 2001). People at risk for bipolar disorder exhibit increased startle attenuation while viewing positive photos of peaceful landscapes and pleasant imagery (Sutton & Johnson, 2002). At-risk bipolar samples also demonstrate elevated cardiac vagal tone, a putative autonomic marker of positive emotion (Gruber, Johnson, Oveis, & Keltner, 2008). Bipolar patients, compared to nonpatients, exhibit increased activity in the amygdala and putamen (Lawrence et al., 2004) as well as the orbitofrontal cortex (Elliott et al., 2004) in response to images of human smiles. Neural activity in these

brain regions has been associated with the experience of positive affect and reward (Rolls, 2000).

Few studies have investigated the effect of cognitive processing strategies on positive emotion in bipolar disorder. Previous research in healthy populations has explored the effects of two important processing strategies – ruminative and reflective – on negative emotional events. *Ruminative processing* refers to the repetitive focus on the content, causes, and consequences of one's affective state not conducive to problem solving (Lyubomirsky & Nolen-Hoeksema, 1995). This type of cognitive processing has also been termed conceptual-evaluative rumination by Watkins (2004) and involves taking an evaluative stance regarding oneself (e.g., “Why did you feel this way?”). Typically, this involves adopting a first-person perspective in which the individual is immersed in the experience, likely focusing on recalling the specific chain of events that occurred and emotions felt (Kross, Ayduk, & Mischel, 2005). As a consequence, researchers argue this leads an individual to relive the emotion and hence elicit an emotional response (e.g., Mclsaac & Eich, 2004). Consistent with this notion, ruminative processing of negative mood has been associated with negative outcomes, including escalation in negative affect (e.g., Nolen-Hoeksema, 2000; Watkins, 2004) and the onset of depressive symptoms in major depression (Nolen-Hoeksema, Wisco, & Lyubomirsky, 2008) and bipolar disorder (Johnson, McMurrich, & McKenzie, 2008; Thomas & Bentall, 2002). Persons at risk for mania

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(Feldman, Joorman, & Johnson, 2008) and those diagnosed with bipolar disorder report a greater tendency to ruminate over positive emotional information relative to controls (e.g., Johnson et al., 2008).

By contrast, *reflective processing* involves analyzing the causes or consequences of one's feelings in a way that is conducive to problem solving (e.g., Ayduk, Mischel, & Downey, 2002; Kross et al., 2005). More specifically, this involves altering the vantage point from which the emotion is recalled to a third-person perspective. It has been argued that distancing oneself from an emotional event enables a person to process their emotions in a more reflective manner that leads to reductions in emotional arousal (Kross et al., 2005). Recent empirical evidence has confirmed these hypotheses, suggesting that processing a negative memory in a reflective, or 'distanced-why' perspective is associated with reductions in negative affect compared to processing the memory in a ruminative, or 'immersed-why' manner (Ayduk et al., 2002; Kross et al., 2005).

Taken together, the research on reflective and ruminative processing has focused almost entirely on negative emotions. Hence the aim of the present study was to answer two questions. First, do reductions in emotional arousal associated with reflective processing of negative emotion (Ayduk et al., 2002; Kross et al., 2005) extend to positive emotion? Based on recent findings suggesting reflective processing is associated with reductions in the intensity of negative emotions (Ayduk et al., 2002; Ayduk & Kross, 2009; Kross et al., 2005), we predicted that both bipolar and healthy control participant groups would exhibit decreases in the intensity of positive emotions in the reflective compared to the ruminative processing condition. In the present study, this would be evidenced by decreases in self-reported positive affect, positive thoughts, positive emotion behavior, and psychophysiological activity in the reflective compared to the ruminative processing condition. Second, are there differences between bipolar disorder and healthy controls in their emotional responses when engaging in reflective and ruminative processing? Based on work research suggesting that bipolar disorder is associated with heightened positive emotional responses (Johnson, 2005; Johnson, Gruber, & Eisner, 2007) and amplified emotional responses to emotional images (Holmes, Geddes, Colom, & Goodwin, 2008), we predicted that bipolar participants would exhibit increased positive emotion reactivity during both processing conditions compared to controls. However, we expected the difference between bipolar and controls to be largest during the ruminative processing condition given that bipolar disorder is thought to reflect trouble regulating positive emotion and a tendency to ruminate over positive events (Feldman et al., 2008; Johnson et al., 2007; Johnson et al., 2008). In the present study, this would be evidenced by increases in self-reported positive affect, positive thoughts, positive emotion behavior, and psychophysiological activity in bipolar compared to control participants across both the reflective and ruminative processing conditions. Furthermore, we expected bipolar participants to exhibit greater increases in the aforementioned measures compared to control participants specifically during the ruminative relative to the reflective processing condition. In the present study, after a 60-second resting baseline period at the beginning of the task, participants completed an autobiographical imagery procedure (adapted from Kross et al., 2005) in which they recalled a happy memory. Using a within-subjects design, participants were then asked to reflect on the same memory across two different conditions. In the ruminative processing condition (i.e., immersed-why), participants were instructed to imagine the positive event by focusing on their deepest thoughts and feelings. In reflective processing condition (i.e., distanced-why), participants were instructed to

adopt a third-person perspective when recalling the event. Throughout the experiment, participants' experiential, behavioral, and autonomic responses were measured.

Method

Participants

Participants were 27 persons diagnosed with bipolar I disorder (BD) and 27 healthy controls (CT) who were fluent in English and between 18 and 63 years of age. They were recruited from the San Francisco Bay Area community via recruitment ads and flyers posted online and in mental health centers. Exclusion criteria included report of a history of severe head trauma, stroke, neurological disease, severe medical illness (e.g., autoimmune disorder), or current alcohol or substance abuse given that these variables are known to influence emotional responding.

Diagnoses of bipolar I disorder were confirmed using the Structured Clinical Interview for DSM-IV (SCID-IV; Spitzer, Williams, Gibbon, & First, 1990). Current euthymic mood status (i.e., neither manic, depressed, nor mixed mood state) for the BD group was verified according to SCID-IV criteria and cutoff scores from the Clinician-Rated Inventory of Depressive Symptoms (IDS-C; score ≤ 11 ; Rush, Gullion, Basco, Jarrett, & Trivedi, 1996; Trivedi et al., 2004) and the Young Mania Rating Scale (YMRS; score ≤ 7 ; Young, Biggs, Ziegler, & Meyer, 1978). We focused on euthymic BD participants to examine whether disturbances in processing positive emotions were independent of current mood state.

The average age at onset for the BD group was 19.52 years ($SD = 12.07$) and average illness duration was 16.20 years ($SD = 11.10$). The lifetime average of manic/hypomanic episodes for BD participants was 8.65 ($SD = 11.71$) and for major depressive episodes was 9.72 ($SD = 10.61$). All BD participants except four were receiving psychotropic medication, including lithium (14.3%), anticonvulsants (42.9%); antidepressants (64.3%), neuroleptics (39.3%); benzodiazepines (14.3%), sedatives (3.6%), stimulants (3.6%), and sleep-enhancing agents (3.6%). A drug-free BD group would have been unrepresentative and unfeasible.¹

BD participants were not excluded on the basis of comorbid disorders (aside from current substance or alcohol use disorders) given that BD is commonly comorbid with one or more disorders (e.g. Kessler, Chiu, Demler, & Walter, 2005). Hence, this enabled us to have a more ecologically valid BD sample. We did, however, ensure that bipolar disorder was the primary diagnosis defined as the most distressing and disabling disorder (Di Nardo, Moras, Barlow, Rapee, & Brown, 1993). Current Axis I comorbidities included agoraphobia ($n = 2$), social phobia ($n = 4$), specific phobia ($n = 5$), obsessive-compulsive disorder ($n = 2$), generalized anxiety disorder ($n = 5$), hypochondriasis ($n = 1$), anorexia ($n = 1$), and binge eating disorder ($n = 1$).

Our control group did not meet criteria for any current or lifetime Axis I disorders assessed (i.e., no anxiety disorders, major depression, mania/hypomania, dysthymia, schizophrenia, schizoaffective disorder, substance abuse, eating disorders, hypochondriasis, pain disorder, and adjustment disorders) using the SCID-IV. Similar to BD participants, control participants also scored below standardized cut-offs on the YMRS and IDS-C.

¹ Levels of each class of medication was recorded using The Somatotherapy Index (Bauer, McBride, Shea, & Gavin, 1997). Bivariate correlations conducted between intensity of medication dosage and our emotion responding variables were modest, inconsistent, and not indicative of a general blunting in emotional responding.

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