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Extreme Attributions Predict Transition from Depression to Mania or Hypomania in Bipolar Disorder

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Abstract

Background—Relatively little is known about psychological predictors of the onset of mania among individuals with bipolar disorder, particularly during episodes of depression. In the present

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Contributors

Jonathan P. Stange conceptualized the paper, conducted the data analyses, write the first draft of the manuscript, and edited the manuscript based on feedback from the co-authors.

Louisa G. Sylvia helped to collect the data for the present study and provided written feedback and edits to drafts of the manuscript.

Pedro Vieira da Silva Magalhães prepared the data for analysis and provided written feedback and edits to drafts of the manuscript.

Ellen Frank was a principle investigator of the parent study and provided written feedback and edits to drafts of the manuscript.

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Andrew A. Nierenberg was an investigator of the parent study and provided written feedback and edits to drafts of the manuscript.

Thilo Deckersbach prepared the data for analysis and provided feedback and edits to drafts of the manuscript.

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study we investigated attributional style as a predictor of onset of hypomanic, manic or mixed episodes among bipolar adults receiving psychosocial treatment for depression. We hypothesized that “extreme” (i.e., excessively pessimistic or optimistic) attributions would predict a greater likelihood of developing an episode of mood elevation.

Method—Outpatients with DSM-IV bipolar I or II disorder ($N=105$) enrolled in the Systematic Treatment Enhancement Program for Bipolar Disorder (STEP-BD) were randomly allocated to one of three types of intensive psychotherapy for depression or a brief psychoeducational intervention. Patients completed a measure of attributional style at baseline and were followed prospectively for up to one year. All analyses were by intent to treat.

Results—Logistic regressions and Cox proportional hazards models indicated that extreme (both positively- and negatively-valenced) attributions predicted a higher likelihood of (and shorter time until) transition from depression to a (hypo)manic or mixed episode ($p < .04$), independent of the effects of manic or depressive symptom severity at baseline. Extreme attributions were also retrospectively associated with more lifetime episodes of (hypo)mania and depression ($p < .05$).

Conclusions—Evaluating extreme attributions may help clinicians to identify patients who are at risk for experiencing a more severe course of bipolar illness, and who may benefit from treatments that introduce greater cognitive flexibility.

Keywords

attributional style; cognitive style; cognitive vulnerability; mania; hypomania; manic switch

Introduction

Bipolar disorder is characterized by periods of depression and/or hypomania/mania, and is associated with substance abuse, poor family functioning (e.g., high rates of divorce), high rates of suicide, and impairment in academic and work achievement (Angst et al., 2002; Goldberg & Burdick, 2008; Goodwin & Jamison, 1990; Grant et al., 2004; Kessler et al., 2006; Martinez-Aran et al., 2004; Nusslock et al., 2007). Individuals with bipolar disorder often experience a course of illness that is highly recurrent (Perlis et al., 2006) and is characterized by frequent mood episodes (Nierenberg et al., 2010). Given the wide variability in the course of bipolar disorder between individuals (Johnson & Meyer, 2005), identifying predictors of which individuals are at higher risk of experiencing a more severe course of illness (e.g., more frequent mood episodes) has significant implications for public health care.

Recent research has focused on psychosocial factors that may be associated with the course of illness in bipolar disorder (Alloy et al., 2009; Johnson & Meyer, 2005). For instance, the behavioral approach system (BAS; Depue & Iacono, 1989) is a motivational system underlying approach to rewards that is hypersensitive in bipolar disorder (Alloy & Abramson, 2010), and that may contribute to the occurrence of episodes of mood elevation when excessively activated (Urosevic et al., 2008). Consistent with this perspective, the tendency to pursue difficult-to-obtain goals, in combination with elevated mood reactivity in response to cues of success and reward, may underlie the ascent to mania in bipolar disorder (Johnson, 2005; Johnson, Fulford, & Carver, 2012; Mansell & Pedley, 2008).

In addition, researchers have suggested that individuals with bipolar disorder often make extreme appraisals about the personal meaning of elevated internal states, which may provoke exaggerated attempts to control elevated mood resulting in maintenance or exacerbation of mood elevation (Mansell et al., 2007). Consistent with this hypothesis, individuals with bipolar disorder have been demonstrated to have high levels of extreme

(conflicting positive and negative) appraisals of internal mood states compared to individuals with major depressive disorder and healthy controls (Kelly et al., 2011; Jones, Mansell & Waller, 2006; Mansell et al., 2011). Furthermore, these appraisals predicted increases in symptoms of mood elevation and depression (Dodd et al., 2011).

Although major life events often precipitate mood episodes (e.g., Johnson et al., 2008), not all individuals with bipolar disorder experience episode recurrence following life events. Thus, mood disorders research has evaluated whether the attributions people make about the causes of life events indicate which individuals are most vulnerable to experiencing mood symptoms following life events. Individuals with a pessimistic attributional style have a tendency to attribute the causes of negative events to internal, stable, and global causes, and to attribute the causes of positive events to external, unstable, and specific causes, making them vulnerable to experiencing depression following stressful life events (Abramson et al., 1978). In contrast, individuals with more optimistic attributional styles tend to attribute the causes of negative events to external, temporary, and specific causes, and to attribute the causes of positive events to internal, stable, and global causes, making them resilient in the face of ordinarily depressogenic life events (Abramson et al., 1978; Needles & Abramson, 1990).

Previous studies have demonstrated the utility of attributional style in identifying individuals at risk for developing unipolar depression (Alloy et al., 2008; Alloy et al., 2006a; Sweeney et al., 1986), as well in predicting fluctuations in depressive symptoms among individuals with bipolar spectrum disorders (Alloy et al., 1999; Johnson & Fingerhut, 2004; Reilly-Harrington et al., 1999). Although attributional style is measured with a continuous scale, several studies have also found that extreme responses on self-report measures of cognition (e.g., indicating “totally agree” or “totally disagree”) predict greater likelihood of relapse in unipolar depression (Beevers et al., 2003; Petersen et al., 2007; Teasdale et al., 2001). In a recent study of adults with bipolar depression, extreme attributions about the causes of life events (made at the “pessimistic” or “optimistic” ends of the scales for internality, stability, and/or globality of causal inferences) were also associated with a lower likelihood of recovery and longer time until recovery from depression (Stange et al., 2013). Interestingly, both extremely *pessimistic* and extremely *optimistic* attributions predicted lower likelihood of recovery, indicating that the valence of attributions may be less important than their extremity in predicting recovery from depression.

Few prospective studies have evaluated attributional style as a predictor of mood elevation in bipolar disorder. One study of individuals with bipolar spectrum disorders demonstrated that both *pessimistic* and *optimistic* attributional styles predicted increases in hypomanic symptoms (Alloy et al., 1999; Reilly-Harrington et al., 1999). However, these studies were limited by small sample sizes and sub-threshold bipolar samples. Moreover, no studies to date have evaluated extreme attributional styles as predictors of mood elevation. For example, it is possible that bipolar individuals who make definitive negative or positive appraisals about the causes of events (e.g., “I’m a total failure,” or “I’m the best at everything”) are vulnerable to experiencing mood reactivity, and hence may be risk for episodes of mania as well as depression.

In the present study, we evaluated attributional style and extreme attributions as predictors of the onset of episodes of mania, hypomania, or mixed episodes among adults with bipolar depression who were taking part in a randomized, controlled trial in the Systematic Treatment Enhancement Program for Bipolar Disorder (STEP-BD). We hypothesized that extreme optimistic and pessimistic attributions would predict a greater likelihood of, and shorter time until, the onset of episodes of mood elevation. We also hypothesized that extreme pessimistic attributions would be associated with a history of more major

depressive episodes, but that extreme optimistic attributions would be associated with a history of more episodes of mood elevation.

Method

Study Design and Participants

Participants were 105 depressed patients with DSM-IV bipolar I (62%) or II (38%) disorder from the 293 outpatients enrolled in the randomized, controlled clinical trial (Miklowitz et al., 2007) that compared the efficacy of intensive psychotherapies and collaborative care treatment as part of the Systematic Treatment Enhancement Program for Bipolar Disorder (STEP-BD; Miklowitz et al., 2007). This subsample of participants was selected because they had completed a measure of attributional style before the first therapy visit. STEP-BD was a naturalistic multi-center study of the effectiveness of treatments for bipolar disorder (Sachs et al., 2003; Miklowitz et al., 2007). Inclusion criteria for the randomized controlled psychosocial intervention trial for depression that was embedded within the context of STEP-BD included meeting DSM-IV criteria for bipolar I or II disorder with a current major depressive episode but not meeting the criteria for a mixed episode or depression not otherwise specified, being 18 years of age or older, not currently undergoing psychotherapy or being willing to taper non-study psychotherapy sessions to one or fewer per month, current treatment with a mood stabilizer, speaking English, and being willing and able to give informed consent. Exclusion criteria were being pregnant or planning pregnancy in the next year, a history of intolerance, nonresponse, or contraindication to bupropion or paroxetine, requiring dose changes in antipsychotic medications, or requiring immediate treatment for a DSM-IV substance or alcohol use or dependence disorder (Miklowitz et al., 2007). All participants provided institutional review board-approved informed consent to participate.

The present study evaluated a subsample of 105 patients from the psychosocial intervention trial who completed a measure of attributional style (the Attributional Style Questionnaire [ASQ]; Peterson et al., 1982) prior to the first psychosocial treatment session (see Table 1). Our subsample did not differ from the full sample on any patient characteristics (χ^2 s < 1.99, t s < 1.62, p s > .11) except for global assessment of functioning scores which were lower in our subsample ($t = 7.65$, $p < .001$), and the severity of initial depressive symptoms which were higher in our subsample ($t = 9.23$, $p < .001$). The number of initial manic symptoms ($t = 1.85$, $p = .07$) was marginally higher in our subsample as well, as measured by the Clinical Monitoring Form (see below; Sachs et al., 2002).

Measures

Clinical Monitoring Form (CMF; Sachs et al., 2002)—The primary outcome measure in the present study was patients' clinical status of mania, hypomania, or mixed episode (from here on referred to as "episodes of elevated mood"), which was assessed by the treating psychiatrist at each outpatient visit (median time between visits was 26 days) via the CMF (Miklowitz et al., 2007; Sachs et al., 2003). The CMF is a frequently used measure of the severity of DSM-IV mood symptoms and clinical status of patients' current mood states/episodes over the past seven days (Miklowitz et al., 2007; Otto et al., 2006; Perlis et al., 2006; Sachs et al., 2002, 2003). Clinical status was based on the presence or absence of DSM-IV criteria for episodes of depression or mania/hypomania/mixed episodes. Initial mania and depression severity were defined as the CMF mania and depression symptom severity scores (sum of the severity of symptoms) at study entry. Each symptom is scored on a 0–2 scale, where 1 or greater is syndromal and 0.5 is subthreshold (Sachs et al., 2002, 2003). Symptom ratings are summed. For mania, symptom severity could range from 0 to 7 and for depression from 0 to 12 (depression symptoms). Intraclass interrater reliability

coefficients (with reference to gold standard ratings for CMF depression and mania items) in the study ranged from 0.83 to 0.99 (Miklowitz et al., 2007). Medication types and dosages were also evaluated with the CMF. We computed a psychiatric medication load variable, following the coding system delineated by Phillips et al. (2008), with higher values representing greater medication load (Table 1).

Attributional Style Questionnaire (ASQ; Peterson et al., 1982)—Attributional style was evaluated with the ASQ prior to psychosocial treatment. Participants write the perceived cause of six hypothetical negative events and six hypothetical positive events. They rate the cause of each of these 12 events on seven-point Likert scales in terms of internality (*due to me* vs. *due to other people or circumstances*), stability (*will always be present* vs. *will never be present*), and globality (*influences all situations in my life* vs. *influences only this particular situation*). A composite score was computed for attributional style for negative and positive events ($Mean = 1.67$, $Median = 2$, $SD = 19.49$) by subtracting the positive event score from the negative event score, such that higher scores indicate more pessimistic attributional style. Consistent with prior studies (Beevers et al., 2003; Petersen et al., 2007; Stange et al., 2013; Teasdale et al., 2001), we also computed the number of “extreme” attributions (rating of a 1 or 7) made on each attributional domain for each event, resulting in variables for extreme pessimistic (sum of ratings of “7” for internality, stability, and/or globality for negative events, and ratings of “1” for positive events; $Mean = 5.88$, $Median = 5$, $SD = 4.80$), extreme optimistic (sum of ratings of “1” for internality, stability, and/or globality for negative events, and ratings of “7” for positive events; $Mean = 4.65$, $Median = 3$, $SD = 4.82$), and total extreme attributions (sum of extreme pessimistic and extreme optimistic responses; $Mean = 10.53$, $Median = 9$, $SD = 8.03$), with higher scores indicating a greater number of extreme responses. Extreme pessimistic and extreme optimistic responses were moderately positively correlated ($r = .39$, $p < .001$). Internal consistency of the ASQ was good ($\alpha = .76$).

Procedures

Participants in STEP-BD were diagnosed by study psychiatrists using the Affective Disorders Evaluation (First et al., 1995; Sachs, 1990), and diagnoses of bipolar disorder were verified by a second clinical interviewer using the Mini-International Neuropsychiatric Interview (version 5.0) (Sheehan et al., 1998). Participants in the present study were randomly assigned to an intensive psychotherapy ($n = 61$; CBT [$n = 31$], IPSRT [$n = 19$], or FFT [$n = 11$]) or to a collaborative care (CC [$n = 44$]) control condition (for more detailed information of these treatments, see Miklowitz et al., 2007; Frank, 2005; Miklowitz, 2010; Otto et al., 2009). CC was a minimal psychosocial intervention that consisted of three 50-minute individual sessions that were conducted within six weeks of randomization. CC sessions included psychoeducation about bipolar disorder and development of a treatment contract. CC was intended to provide a brief version of the most strategies most commonly shown to benefit patients with bipolar disorder. In contrast, the intensive treatments were enhanced versions of CBT, IPSRT and FFT (Miklowitz et al., 2007). Intensive psychosocial treatments consisted of up to thirty 50-minute sessions conducted by psychotherapists who received training and supervision from nationally-recognized experts in the specific intensive treatments (Miklowitz et al., 2007).

Statistical Analysis

To evaluate the effects of attributional style and extreme responses on likelihood of mania and time until mania, we conducted logistic regressions and cox proportional hazards models, respectively. All analyses were by intent to treat. Patients were included until their final assessment point with a maximum of 365 days in the study (Miklowitz et al., 2007) ($M = 291.47$ days, $SD = 96.93$). The proportionality of risk assumption was not upheld for

survival analyses involving baseline mania symptoms, so the time-dependent covariate (interaction term between time and baseline mania symptoms) was included in all analyses (Tabachnik & Fidell, 2007). The results were consistent regardless of whether this term was included in the model. Odds ratios greater than one indicate greater likelihood of mania and less time until mania.

To evaluate the incremental ability of attributional style and extreme attributions to predict episodes of elevated mood beyond the effects of treatment or initial mania symptoms, treatment condition (CC or intensive psychotherapy) and initial mania symptoms were included in Step 1 of the regression models, and ASQ variables were entered in Step 2. Finally, to evaluate whether ASQ variables were retrospectively associated with a more severe course of BD, we conducted correlations between ASQ variables and number of lifetime episodes of mood elevation and depression (assessed via interview at the baseline visit).

Results

Preliminary Analyses of Potential Covariates

Demographic and clinical characteristics including psychopharmacological medications, medication load, depressive and manic symptoms at baseline, attrition, and treatment completion, are shown in Table 1. Demographic and clinical characteristics of the full sample are available in Miklowitz et al. (2007). Twenty-two individuals experienced the onset of an episode of mood elevation (mania, $n = 5$, hypomania, $n = 11$, or mixed, $n = 6$). Because of relatively low frequency rates, we collapsed all episodes of mood elevation into one composite variable representing the first prospective onset of mania, hypomania, or a mixed episode for each participant.

In this subsample of 105 study participants, there was no significant effect of treatment group (intensive psychotherapy versus CC) on likelihood of an episode of elevated mood ($Bs = -0.05$, Wald = 0.01, OR = 0.95, $p = .92$, 95% CI = .37–2.47, $R^2 < .01$), or time to an episode of elevated mood ($B = -0.05$, Wald = 0.01, OR = 0.95, $p = .92$, 95% CI = .41–2.24). Antidepressant use did not predict likelihood of an episode of elevated mood ($B = 0.69$, Wald = 2.00, OR = 2.00, 95% CI = .77–5.20, $p = .16$, $R^2 = .03$) or time to an episode of elevated mood. Total psychiatric medication load also did not predict likelihood of an episode of elevated mood ($B = 0.12$, Wald = 1.01, OR = 1.13, 95% CI = .89–1.44, $p = .32$, $R^2 = .02$) or time to an episode of elevated mood ($B = 0.48$, Wald = 0.20, OR = 1.05, 95% CI = .85–1.29, $p = .65$). ASQ variables were not significantly associated with initial symptoms of mania ($rs < .14$, $ps > .18$) or depression ($rs < .13$, $ps > .19$).

Incremental Effects of Attributional Style on Prospective Onset of Mania, Hypomania, or Mixed Episodes

Baseline symptoms of mania and depression and treatment group were entered into the first step of each model, followed by ASQ variables. Primary analysis results (logistic regression analyses predicting an episode of elevated mood, and Cox regression analyses predicting time until an episode of elevated mood) are displayed in Table 2.

Controlling for treatment group (intensive psychotherapy vs. collaborative care) and initial mania symptoms, there was no significant effect of ASQ total score on likelihood of mood elevation or on time until mood elevation (Table 2). However, consistent with our hypotheses, ASQ total extreme responses predicted a significantly higher likelihood of mood elevation and a shorter time until mood elevation (Table 2; Figure 1). This effect occurred in the same direction for extreme pessimistic responses as well as extreme optimistic responses, although these separate effects did not all achieve statistical

significance: extreme pessimistic (Logistic: $B = 0.09$, Wald = 3.45, OR = 1.10, 95% CI = 1.00–1.21, $p = .06$; Cox: $B = 0.08$, Wald = 4.35, OR = 1.08, 95% CI = 1.01–1.16, $p = .04$), extreme optimistic (Logistic: $B = 0.08$, Wald = 2.90, OR = 1.08, 95% CI = .99–1.19, $p = .09$; Cox: $B = 0.07$, Wald = 3.20, OR = 1.07, 95% CI = .99–1.15, $p = .07$).

All results remained consistent after controlling for study site, number of psychosocial treatment sessions, bipolar I or II status, age, gender, education, number of lifetime episodes of depression and mania/hypomania, psychiatric medication load, and age at onset of bipolar disorder.

Are Attributional Style or Extreme Attributions Retrospectively Associated with a More Severe Course of Bipolar Disorder?

ASQ total score, ASQ positive event score, and ASQ negative event scores were not significantly correlated with number of lifetime episodes of depression ($r_s < .16$, $p_s > .14$) or mania/hypomania ($r_s < .10$, $p_s > .36$). However, ASQ total extreme responses were significantly positively correlated with number of lifetime episodes of depression ($r = .25$, $p = .02$), and this association was true for both extreme pessimistic responses ($r = .21$, $p = .04$) and extreme optimistic responses ($r = .21$, $p < .05$). In contrast, only ASQ extreme optimistic responses were significantly correlated with number of lifetime episodes of mood elevation ($r = .20$, $p < .05$; all other $r_s < .12$, $p_s > .25$). Thus, extreme attributions, regardless of valence, appeared to be retrospectively associated with more episodes of depression, whereas only extreme optimistic attributions were retrospectively associated with more episodes of mood elevation. These results remained consistent when entered into linear regressions controlling for baseline symptoms of mania and depression, with the exception of extreme pessimistic responses which no longer reached conventional levels of statistical significance for the number of lifetime depressive episodes ($\beta = .16$, $t = 1.51$, $p = .13$).

Discussion

These results indicate that, consistent with our hypotheses, extreme attributions predicted a greater likelihood and shorter time until experiencing the onset of a manic, hypomanic, or mixed episode, among adults with bipolar disorder who were experiencing a major depressive episode at study entry. Notably, these effects appeared to be associated with both extreme negative and extreme positive attributions, and were independent of effects of baseline mood symptoms. In addition, we found that whereas extreme pessimistic attributions were associated with a history of more major depressive episodes, extreme optimistic attributions were associated with a history of more episodes of depression *and* mood elevation. Extreme pessimistic and extreme optimistic attributions were also correlated with each other, indicating that among individuals with bipolar disorder the tendency to make extreme attributions may reflect a construct broader than the specific content of attributions themselves (i.e., a general tendency toward extreme attributions). These results are consistent with the notion that the inflexibility of thoughts or beliefs may be more important than their valence (i.e., positive or negative) in understanding the course of mood disorders (e.g., Beevers et al., 2003; Petersen et al., 2007; Stange et al., 2013; Teasdale et al., 2001). Individuals who make extreme attributions may have difficulty seeing situations from multiple perspectives, which may lead them to make absolutist types of attributions about the causes of life events (e.g., “definitely due to me,” or “will influence all situations in my life”). It is possible that extreme attributions may also reflect an inability to shift mental set (i.e., cognitive rigidity) to consider other more moderate explanations that are less emotionally salient. Indeed, biased attributions may lead to changes in behavior and mood that may precipitate the onset of mood episodes (e.g., Mansell et al., 2007). These data are concordant with neuroimaging and neurocognitive data showing deficits in social

cognition and theory of mind that appears to be a trait marker of bipolar disorder (Mercer & Becerra, 2013; Samame, Martino, & Strejilevich, 2012).

We did not find that overall attributional style in general was associated with prospective episodes of mood elevation, although we did not evaluate the presence of life events that occurred over the year of follow-up. It is possible that general attributional style may be most useful in indicating vulnerability to episodes more specifically among individuals who experience high levels of life events (Alloy et al., 2006b). However, the finding that only extreme attributions were associated with the number of lifetime mood episodes of depression and mania/hypomania supports the hypothesis that extreme attributions may be the best attributional markers of a more severe course of bipolar illness.

There are other potential reasons why extreme attributions might predict mood episodes in bipolar disorder. First, it is possible that extreme attributions are associated with a more severe course of illness because of cognitive inflexibility (e.g., Dickerson et al., 2004), although whether baseline executive functioning predicts the onset of mood episodes remains to be evaluated prospectively. Extreme optimistic attributions may predict the onset of mood elevation because they may be associated with an excessively confident or overgeneralized positive outlook on the causes of good events (e.g., Stange et al., 2012), which might lead to the initiation of excessive goal-striving and activation of the BAS, particularly following positive or BAS-activating life events (Johnson, 2005; Urosevic et al., 2008). Additionally, given that rates of goal-striving events and rates of BAS-deactivating life events are significantly correlated in bipolar samples (Urosevic et al., 2010), it is possible that excessive goal striving as a result of extreme attributions may ultimately lead bipolar individuals to experience BAS-deactivating life events, which could lead to depression, which would be consistent with the retrospective data in our study.

The link between extreme pessimistic attributions and the onset of an episode of elevated mood could also be viewed as consistent with the manic defense theory (e.g., Lyon et al., 1999), in that periods of mood elevation may be a defensive reaction to an individual's underlying depressive tendencies (e.g., the tendency to make extreme pessimistic attributions for events). For example, some bipolar patients with a pessimistic attributional style might have developed a tendency to make extreme optimistic attributions in response to events that result in negative emotion (e.g., losing one's job might initially result in a negative attribution about oneself that would lead to feelings of sadness, which could trigger a defensive extreme optimistic attribution, such as "it's not my fault, my boss is a total idiot"). If so, then among bipolar individuals who make extreme attributions, mania/hypomania could also be triggered by the occurrence of negative life events. It is also possible that extremity in attributional style and cognitive schemas may be related to underlying personality characteristics that may be associated with poorer outcome, including personality disorders (such as borderline personality disorder, which is characterized by dichotomous thinking styles) (Zimmerman et al., 2012). Finally, it is possible that the tendency to make extreme explanations about personally-relevant stimuli (such as life events and internal states) is characteristic of bipolar disorder and may result in elevated mood reactivity, ineffective regulation of goals, and a poorer course of illness (e.g., Johnson et al., 2012; Mansell et al., 2007). These possibilities should be tested in future studies before firm conclusions can be drawn.

We evaluated the recurrence of episodes of mood elevation in a sample that was receiving psychosocial treatment for a current depressive episode. Because of sample size limitations we were not able to evaluate direct "switches" from depression to mood elevation without a period of recovery between episodes (e.g., Angst, 1987). This sample was involved in a randomized, controlled trial of psychosocial treatment for depression, so it is unclear

whether the results necessarily extend to other samples not engaged in psychotherapy. We also did not evaluate executive functioning, so it is possible that this pattern of results is attributable to cognitive rigidity (e.g., impaired ability to shift mental sets) more generally rather than to attributional style specifically. Next, we only evaluated attributional style at baseline when participants were depressed, so the extent to which patients would make the same types of attributions across the course of the disorder (e.g., when euthymic or manic) is not clear, nor is it clear whether attributions changed as a result of psychosocial treatment. Attributional style was also evaluated only for hypothetical events, so it will be important for future studies to use experience sampling methods or daily diary studies to evaluate attributions made for actual negative and positive events that patients experienced (e.g., Hankin et al., 2005).

Evaluating attributional style may provide clinically-useful information to clinicians in determining which patients are at greatest risk for mania or hypomania after a major depressive episode. Identifying which patients tend to make extreme attributions may allow for more intensive treatments to be directed particularly toward patients with higher levels of maladaptive cognitions. In addition, it is possible that traditional CBT for bipolar disorder is not adequately effective in restructuring extreme maladaptive cognitions. Schema-focused cognitive therapy is a potential intervention that could target this issue (Ball et al., 2003). If extreme attributions reflect compromised abilities in cognitive flexibility, psychosocial interventions that target improving deficits in executive functioning (e.g., Deckersbach et al., 2010, 2012; Stange et al., 2011) may be useful in improving the course of illness among bipolar patients who make extreme attributions. Finally, mindfulness-based treatments for bipolar disorder emphasize nonjudgmental awareness of thoughts and emotions (e.g., Deckersbach et al., 2012), which may help patients with extreme beliefs to distance themselves from their thoughts, allowing for the use of more balanced attributions or more appropriate strategies for coping with fluctuations in mood.

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References

- Abramson LY, Metalsky GI, Alloy LB. Hopelessness depression: A theory-based subtype of depression. *Psychol. Rev.* 1989; 96(2):358–372.
- Abramson LY, Seligman ME, Teasdale JD. Learned helplessness in humans: critique and reformulation. *J Abnorm Psychol.* 1978 Feb; 87(1):49–74. [PubMed: 649856]
- Alloy LB, Abramson LY. The role of the Behavioral Approach System (BAS) in bipolar spectrum disorders. *Curr Dir Psychol Sci.* 2010; 19(3):189–194. [PubMed: 20606725]
- Alloy, LB.; Abramson, LY.; Keyser, J.; Gerstein, RK.; Sylvia, LG. Negative cognitive style. In: Dobson, KS.; Dozois, DJA., editors. *Risk Factors in Depression*. New York: Academic Press; 2008. p. 221-236.
- Alloy LB, Abramson LY, Urosevic S, Bender RE, Wagner CA. Longitudinal Predictors of Bipolar Spectrum Disorders: A Behavioral Approach System (BAS) Perspective. *Clin Psychol (New York).* 2009; 16(2):206–226. [PubMed: 20161008]
- Alloy LB, Abramson LY, Whitehouse WG, Hogan ME, Panzarella C, Rose DT. Prospective incidence of first onsets and recurrences of depression in individuals at high and low cognitive risk for depression. *J Abnorm Psychol.* 2006a Feb; 115(1):145–156. [PubMed: 16492105]
- Alloy, LB.; Reilly-Harrington, NA.; Fresco, DM.; Flannery-Schroeder, E. Cognitive vulnerability to bipolar spectrum disorders. In: Alloy, LB.; Riskind, JH., editors. *Cognitive vulnerability to emotional disorders*. New York: Erlbaum; 2006b. p. 33-61.
- Alloy LB, Reilly-Harrington N, Fresco DM, Whitehouse WG, Zechmeister JS. Cognitive styles and life events in subsyndromal unipolar and bipolar disorders: Stability and prospective prediction of depressive and hypomanic mood swings. *J. Cog. Psychother.* 1999; 13:21–40.
- Angst F, Stassen HH, Clayton PJ, Angst J. Mortality of patients with mood disorders: follow-up over 34–38 years. *J Affect Disord.* 2002 Apr; 68(2–3):167–181. [PubMed: 12063145]
- Angst J. Switch from depression to mania, or from mania to depression. *J Psychopharmacol.* 1987 Jan; 1(1):13–19. [PubMed: 22158748]
- Ball J, Mitchell P, Malhi G, Skillecorn A, Smith M. Schema-focused cognitive therapy for bipolar disorder: reducing vulnerability to relapse through attitudinal change. *Aust N Z J Psychiatry.* 2003 Feb; 37(1):41–48. [PubMed: 12534655]
- Beevers CG, Keitner GI, Ryan CE, Miller IW. Cognitive predictors of symptom return following depression treatment. *J Abnorm Psychol.* 2003 Aug; 112(3):488–496. [PubMed: 12943027]
- Deckersbach T, Hölzel BK, Eisner LR, Stange JP, Peckham AD, Dougherty DD, Rauch SL, Lazar S, Nierenberg AA. Mindfulness-based cognitive therapy for nonremitted patients with bipolar disorder. *CNS Neurosci Ther.* 2012 Feb; 18(2):133–141. [PubMed: 22070469]
- Deckersbach T, Nierenberg AA, Kessler R, Lund HG, Ametrano RM, Sachs G, Rauch SL, Dougherty D. Cognitive rehabilitation for bipolar disorder: An open trial for employed patients with residual depressive symptoms. *CNS Neurosci Ther.* 2010 Oct; 16(5):298–307. [PubMed: 19895584]
- Depue RA, Iacono WG. Neurobehavioral aspects of affective disorders. *Annu Rev Psychol.* 1989; 40:457–492. [PubMed: 2648983]

- Dickerson FB, Boronow JJ, Stallings CR, Origoni AE, Cole S, Yolken RH. Association between cognitive functioning and employment status of persons with bipolar disorder. *Psychiatr Serv*. 2004 Jan; 55(1):54–58. [PubMed: 14699201]
- Dodd AL, Mansell W, Morrison AP, Tai S. Extreme appraisals of internal states and bipolar symptoms: the Hypomanic Attitudes and Positive Predictions Inventory. *Psychol Assess*. 2011 Sep; 23(3):635–645. [PubMed: 21500923]
- First, MB.; Spitzer, RL.; Gibbon, M.; Williams, JBW. Structured Clinical Interview for DSM-IV Axis I Disorders. New York: Biometrics Research Department, New York State Psychiatric Institute; 1995.
- Frank, E. Treating bipolar disorder: A clinician's guide to interpersonal and social rhythm therapy. New York: Guilford Press; 2005.
- Goldberg, JF.; Burdick, KE., editors. Cognitive dysfunction in bipolar disorder. Washington, DC: American Psychiatric Publishing; 2008.
- Goodwin, FK.; Jamison, KR. Manic-depressive illness. New York: Oxford University Press; 1990.
- Grant BF, Stinson FS, Dawson DA, Chou SP, Dufour MC, Compton W, Pickering RP, Kaplan K. Prevalence and co-occurrence of substance use disorders and independent mood and anxiety disorders: results from the National Epidemiologic Survey on Alcohol and Related Conditions. *Arch Gen Psychiatry*. 2004 Aug; 61(8):807–816. [PubMed: 15289279]
- Hankin BL, Fraley RC, Abela JR. Daily depression and cognitions about stress: evidence for a traitlike depressogenic cognitive style and the prediction of depressive symptoms in a prospective daily diary study. *J Pers Soc Psychol*. 2005 Apr; 88(4):673–685. [PubMed: 15796667]
- Johnson SL. Life events in bipolar disorder: towards more specific models. *Clin Psychol Rev*. 2005 Dec; 25(8):1008–1027. [PubMed: 16129530]
- Johnson SL, Cuellar AK, Ruggero C, Winett-Perlman C, Goodnick P, White R, Miller I. Life events as predictors of mania and depression in bipolar I disorder. *J Abnorm Psychol*. 2008 May; 117(2): 268–277. [PubMed: 18489203]
- Johnson SL, Fingerhut R. Cognitive styles predict the course of bipolar depression, not mania. *J. Cog. Psychother*. 2004; 18:149–162.
- Johnson SL, Fulford D, Carver CS. The double-edged sword of goal engagement: consequences of goal pursuit in bipolar disorder. *Clin Psychol Psychother*. 2012 Jul-Aug; 19(4):352–362. [PubMed: 22610999]
- Johnson, SL.; Meyer, B. Psychosocial predictors of symptoms. In: Johnson, SL.; Leahy, RL., editors. *Psychological Treatment of Bipolar Disorder*. New York: Guilford Press; 2005. p. 83-108.
- Jones S, Mansell W, Waller L. Appraisal of hypomania-relevant experiences: development of a questionnaire to assess positive self-dispositional appraisals in bipolar and behavioural high risk samples. *J Affect Disord*. 2006 Jul; 93(1–3):19–28. [PubMed: 16503056]
- Kelly RE, Mansell W, Wood AM, Alatiq Y, Dodd A, Searson R. Extreme positive and negative appraisals of activated states interact to discriminate bipolar disorder from unipolar depression and non-clinical controls. *J Affect Disord*. 2011 Nov; 134(1–3):438–443. [PubMed: 21683449]
- Kessler RC, Akiskal HS, Ames M, Birnbaum H, Greenberg P, Hirschfeld RM, Jin R, Merikangas KR, Simon GE, Wang PS. Prevalence and effects of mood disorders on work performance in a nationally representative sample of U.S workers. *Am J Psychiatry*. 2006 Sep; 163(9):1561–1568. [PubMed: 16946181]
- Lyon HM, Startup M, Bentall RP. Social cognition and the manic defense: attributions, selective attention, and self-schema in bipolar affective disorder. *J Abnorm Psychol*. 1999 May; 108(2): 273–282. [PubMed: 10369037]
- Mansell W, Morrison AP, Reid G, Lowens I, Tai S. The interpretation of, and responses to, changes in internal states: An integrative cognitive model of mood swings and bipolar disorders. *Beh Cog Psychother*. 2007; 35:515–539.
- Mansell W, Pedley R. The ascent into mania: a review of psychological processes associated with the development of manic symptoms. *Clin Psychol Rev*. 2008 Mar; 28(3):494–520. [PubMed: 17825463]
- Mansell W, Paszek G, Seal K, et al. Extreme appraisals of internal states in bipolar I disorder: a multiple control group study. *Cog. Ther. Res*. 2011; 35:87–97.

- Martínez-Arán A, Vieta E, Colom F, Torrent C, Sánchez-Moreno J, Reinares M, Benabarre A, Goikolea JM, Brugué E, Daban C, Salamero M. Cognitive impairment in euthymic bipolar patients: implications for clinical and functional outcome. *Bipolar Disord*. 2004 Jun; 6(3):224–232. [PubMed: 15117401]
- Mercer L, Becerra R. A unique emotional processing profile of euthymic bipolar disorder? A critical review. *J Affect Disord*. 2013 Apr 25; 146(3):295–309. [PubMed: 23218848]
- Miklowitz, DJ. 2nd edition. New York: Guilford Press; 2010. *Bipolar Disorder: A family-focused treatment approach*.
- Miklowitz DJ, Otto MW, Frank E, Reilly-Harrington NA, Wisniewski SR, Kogan JN, Nierenberg AA, Calabrese JR, Marangell LB, Gyulai L, Araga M, Gonzalez JM, Shirley ER, Thase ME, Sachs GS. Psychosocial treatments for bipolar depression: a 1-year randomized trial from the Systematic Treatment Enhancement Program. *Arch Gen Psychiatry*. 2007 Apr; 64(4):419–426. [PubMed: 17404119]
- Needles DJ, Abramson LY. Positive life events, attributional style, and hopefulness: testing a model of recovery from depression. *J Abnorm Psychol*. 1990 May; 99(2):156–165. [PubMed: 2348009]
- Nierenberg AA, Akiskal HS, Angst J, Hirschfeld RM, Merikangas KR, Petukhova M, Kessler RC. Bipolar disorder with frequent mood episodes in the national comorbidity survey replication (NCS-R). *Mol Psychiatry*. 2010 Nov; 15(11):1075–1087. [PubMed: 19564874]
- Nusslock R, Abramson LY, Harmon-Jones E, Alloy LB, Hogan ME. A goal-striving life event and the onset of hypomanic and depressive episodes and symptoms: perspective from the behavioral approach system (BAS) dysregulation theory. *J Abnorm Psychol*. 2007 Feb; 116(1):105–115. [PubMed: 17324021]
- Otto, MW.; Reilly-Harrington, NA.; Kogan, JN.; Henin, A.; Knauz, RO.; Sachs, GS. *Managing bipolar disorder: A cognitive-behavioral approach (Therapist guide)*. New York: Oxford University Press; 2009.
- Otto MW, Simon NM, Wisniewski SR, Miklowitz DJ, Kogan JN, Reilly-Harrington NA, Frank E, Nierenberg AA, Marangell LB, Sagduyu K, Weiss RD, Miyahara S, Thase ME, Sachs GS, Pollack MH. STEP-BD Investigators. Prospective 12-month course of bipolar disorder in out-patients with and without comorbid anxiety disorders. *Br J Psychiatry*. 2006 Jul; 189:20–25. [PubMed: 16816301]
- Perlis RH, Ostacher MJ, Patel JK, Marangell LB, Zhang H, Wisniewski SR, Ketter TA, Miklowitz DJ, Otto MW, Gyulai L, Reilly-Harrington NA, Nierenberg AA, Sachs GS, Thase ME. Predictors of recurrence in bipolar disorder: primary outcomes from the Systematic Treatment Enhancement Program for Bipolar Disorder (STEP-BD). *Am J Psychiatry*. 2006 Feb; 163(2):217–224. [PubMed: 16449474]
- Peterson TJ, Feldman G, Harley R, Fresco DM, Graves L, Holmes A, Bogdan R, Papakostas GI, Bohn L, Lury RA, Fava M, Segal ZV. Extreme response style in recurrent and chronically depressed patients: change with antidepressant administration and stability during continuation treatment. *J Consult Clin Psychol*. 2007 Feb; 75(1):145–153. [PubMed: 17295573]
- Peterson C, Semmel A, von Baeyer C, Abramson LY, Metalsky GI, Seligman MEP. The Attributional Style Questionnaire. *Cog. Ther. Res*. 1982; 6:287–300.
- Phillips ML, Travis MJ, Fagioli A, Kupfer DJ. Medication effects in neuroimaging studies of bipolar disorder. *Am J Psychiatry*. 2008 Mar; 165(3):313–320. [PubMed: 18245175]
- Reilly-Harrington NA, Alloy LB, Fresco DM, Whitehouse WG. Cognitive styles and life events interact to predict bipolar and unipolar symptomatology. *J Abnorm Psychol*. 1999 Nov; 108(4): 567–578. [PubMed: 10609421]
- Sachs GS. Use of clonazepam for bipolar affective disorder. *J Clin Psychiatry*. 1990 May; 51(Suppl): 31–34. [PubMed: 1970815]
- Sachs GS, Guille C, McMurich SL. A clinical monitoring form for mood disorders. *Bipolar Disord*. 2002 Oct; 4(5):323–327. [PubMed: 12479665]
- Sachs GS, Thase ME, Otto MW, Bauer M, Miklowitz D, Wisniewski SR, Lavori P, Lebowitz B, Rudorfer M, Frank E, Nierenberg AA, Fava M, Bowden C, Ketter T, Marangell L, Calabrese J, Kupfer D, Rosenbaum JF. Rationale, design, and methods of the systematic treatment

- enhancement program for bipolar disorder (STEP-BD). *Int J Psychiatry*. 2003 Jun 1;53(11):1028–1042.
- Samamé C, Martino DJ, Strejilevich SA. Social cognition in euthymic bipolar disorder: systematic review and meta-analytic approach. *Acta Psychiatr Scand*. 2012 Apr; 125(4):266–280. [PubMed: 22211280]
- Sheehan DV, Lecrubier Y, Sheehan KH, Amorim P, Janavs J, Weiller E, Hergueta T, Baker R, Dunbar GC. The Mini-International Neuropsychiatric Interview (M.I.N.I.): the development and validation of a structured diagnostic psychiatric interview for DSM-IV and ICD-10. *J Clin Psychiatry*. 1998; 59(20(Suppl)):22–33. [PubMed: 9881538]
- Stange JP, Eisner LR, Hölzel BK, Peckham AD, Dougherty DD, Rauch SL, Nierenberg AA, Lazar S, Deckersbach T. Mindfulness-based cognitive therapy for bipolar disorder: effects on cognitive functioning. *J Psychiatr Pract*. 2011 Nov; 17(6):410–419. [PubMed: 22108398]
- Stange JP, Molz AR, Black CL, Shapero BG, Bacelli JM, Abramson LY, Alloy LB. Positive overgeneralization and Behavioral Approach System (BAS) sensitivity interact to predict prospective increases in hypomanic symptoms: a behavioral high-risk design. *Behav Res Ther*. 2012 Apr; 50(4):231–239. [PubMed: 22342167]
- Stange JP, Sylvia LG, Magalhães PV, Miklowitz DJ, Otto MW, Frank E, Berk M, Nierenberg AA, Deckersbach T. Extreme attributions predict the course of bipolar depression: Results from the STEP-BD randomized controlled trial of psychosocial treatment. *J. Clin. Psychiatry*. 2013; 74(3): 249–255. [PubMed: 23561230]
- Sweeney PD, Anderson K, Bailey S. Attributional style in depression: a meta-analytic review. *J Pers Soc Psychol*. 1986 May; 50(5):974–991. [PubMed: 3712233]
- Tabachnik, BG.; Fidell, LS. 5th ed.. Boston: Pearson; 2007. Using multivariate statistics.
- Teasdale JD, Scott J, Moore RG, Hayhurst H, Pope M, Paykel ES. How does cognitive therapy prevent relapse in residual depression? Evidence from a controlled trial. *J Consult Clin Psychol*. 2001 Jun; 69(3):347–357. [PubMed: 11495165]
- Urosevi S, Abramson LY, Alloy LB, Nusslock R, Harmon-Jones E, Bender R, Hogan ME. Increased rates of events that activate or deactivate the behavioral approach system, but not events related to goal attainment, in bipolar spectrum disorders. *J Abnorm Psychol*. 2010 Aug; 119(3):610–615. [PubMed: 20677850]
- Urosevi S, Abramson LY, Harmon-Jones E, Alloy LB. Dysregulation of the behavioral approach system (BAS) in bipolar spectrum disorders: review of theory and evidence. *Clin Psychol Rev*. 2008 Oct; 28(7):1188–1205. [PubMed: 18565633]
- Zimmerman M, Martinez JH, Young D, Chelminski I, Dalrymple K. Sustained unemployment in psychiatric outpatients with bipolar depression compared to major depressive disorder with comorbid borderline personality disorder. *Bipolar Disord*. 2012 Dec; 14(8):856–862. [PubMed: 23057759]

Figure 1.
Cox Regression of Total Extreme Attributions Predicting Time until Mania, Hypomania, or Mixed Episode.

Table 1**Demographic and Illness Characteristics of Sample.**

Variable	Value
Age, mean $\pm$ SD	39.85 $\pm$ 11.77
Female sex	61%
Race	
Caucasian/White	94%
African American/Black	5%
Asian/Pacific Islander	0%
Other	1%
Hispanic ethnicity	1%
Education >1 year of college	85%
Income < \$29,999	38%
Marital status	
Married	33%
Never married	36%
Separated/Divorced	28%
Widowed	2%
Diagnosis	
Bipolar I	62%
Bipolar II	38%
>10 Previous depressive episodes	65%
>10 Previous manic episodes	67%
Age at illness onset, mean $\pm$ SD	21.97 $\pm$ 10.11
Baseline mania symptoms, mean $\pm$ SD	1.16 $\pm$ 1.17
Baseline depression symptoms, mean $\pm$ SD	6.25 $\pm$ 2.43
Baseline GAF score, mean $\pm$ SD	55.98 $\pm$ 8.60
Medications	
Lithium	34%
Atypical antipsychotic	25%
Anticonvulsant	55%
Benzodiazepine	24%
Antidepressants	46%
Stimulants	1%
Valproate	36%
Other mood stabilizers	27%
Medication Load Index	3.63 (1.95)
Comorbid diagnoses	
Anxiety disorder (current)	48%
Substance abuse/dependence (current)	13%
ADHD (current)	9%
Any lifetime comorbid disorder	83%

Note. Data are presented as number (percentage) unless otherwise indicated. Percentages are not always based on 105 patients owing to missing data (see Miklowitz et al., 2007).

Logistic Regression and Cox Regression Analyses Evaluating Attributional Style and Extreme Attributions as Predictors of Mania, Hypomania, or Mixed Episode

Table 2

Step	Predictor	B	Wald	OR	p	95% CI	ΔR^2
ASQ Total Score Models							
<u>Logistic Regression: Predicting Onset of Episode of Mood Elevation</u>							
1	CMF Depression Symptom00s	-0.10	0.89	0.90	.35	0.73–1.11	.09
	CMF Mania Symptoms	0.48	4.66	1.61	.03	1.04–2.49	
	Treatment Group	-0.21	0.16	0.81	.69	0.29–2.24	
2	ASQ Total	<0.01	0.04	1.00	.84	0.98–1.03	<.01
<u>Cox Regression: Predicting Time Onset of Episode of Mood Elevation</u>							
1	CMF Depression Symptoms	-0.09	0.88	0.92	.35	0.77–1.10	
	CMF Mania Symptoms	1.65	7.77	5.21	.01	1.63–16.60	
	CMF Mania Symptoms X Time	-0.29	3.79	0.75	.05	0.56–1.00	
	Treatment Group	-0.21	0.21	0.81	.65	0.33–1.98	
2	ASQ Total	<0.01	0.11	1.00	.74	0.98–1.03	<.01
ASQ Extreme Total Models							
<u>Logistic Regression: Predicting Onset of Episode of Mood Elevation</u>							
1	CMF Depression Symptoms	-0.08	0.53	0.93	.47	0.76–1.14	.09
	CMF Mania Symptoms	0.44	4.38	1.56	.04	1.03–2.36	
	Treatment Group	-0.10	0.03	0.91	.86	0.32–2.58	
2	ASQ Extreme Total	0.06	3.92	1.06	<.05	1.00–1.13	.05
<u>Cox Regression: Predicting Time Until Onset of Episode of Mood Elevation</u>							
1	CMF Depression Symptoms	-0.06	0.58	0.94	.44	0.80–1.11	
	CMF Mania Symptoms	1.73	8.18	5.65	<.01	1.72–18.53	
	CMF Mania Symptoms X Time	-0.31	4.33	0.73	.04	0.54–0.98	
	Treatment Group	-0.04	0.01	0.96	.94	0.39–2.38	
2	ASQ Extreme Total	0.05	4.54	1.05	.03	1.00–1.11	.04

Note. $N=105$. Change in R^2 for logistic regressions represents Nagelkerke R^2 change since previous step, an estimate of the increment in variance in the probability of recovery accounted for by the predictors tested since the previous step⁷³. Change in R^2 for Cox regressions represents Cox-Snell R^2 change since previous step, an estimate of the relative association between survival and the predictors

tested since the previous step (Tabachnik & Fidell, 2007). The proportionality of risk assumption was not upheld for survival analyses involving CMF (baseline) mania symptoms, so the time-dependent covariate (interaction term between time and baseline mania symptoms) is included in Cox regression analyses (Tabachnik & Fidell, 2007). Treatment Group = Intensive psychosocial treatment (1) vs. Collaborative Care (0).