Cognitive Responses to Failure and Success Relate Uniquely to Bipolar Depression Versus Mania

Lori R. Eisner, **Sheri L. Johnson**, and **Charles S. Carver**
Department of Psychology, University of Miami.

Abstract

This project examined cognitive responses to failure and success and their association with depression and mania within bipolar disorder. Many cognitive variables that are associated with unipolar depression have been found to be involved in bipolar disorder, more specifically bipolar depression. This research was the first to examine tendencies to hold high standards, engage in self-criticism, and generalize from failure to an overall sense of self-worth. In Study 1, undergraduates were screened for risk of mood disorders and completed structured diagnostic interviews. History of bipolar spectrum disorders and history of depression had separate associations with negative generalization. The association of generalization with bipolar spectrum disorders was accounted for by current depressive symptoms. For Study 2, the authors developed a measure of the tendency to engage in positive generalization following success experiences. In a sample of 276 undergraduates, this measure related uniquely to risk for mania. Results of these 2 studies suggest that responses to failure are associated with a history of depression, whereas responses to success are associated with a risk for mania. Implications for future research and clinical work are discussed.

Keywords

bipolar disorder; mania; cognition; success; failure

Bipolar disorder is one of the most severe of psychiatric disorders. Although it is well established that mood-stabilizing medications are helpful, rates of relapse (Judd et al., 2002) and suicide (Angst, Stassen, Clayton, & Angst, 2002; Mitchell, Slade, & Andrews, 2004) remain quite high even with best available medications (Keller et al., 1992). Given this, substantial effort has been directed toward developing psychosocial treatments that can be offered as adjuncts to medication treatment (Johnson & Leahy, 2003).

At least three books have been published detailing cognitive therapy as intervention to supplement medications for bipolar disorder (Basco & Rush, 1996, 2005; Lam, Jones, Bright, & Hayward, 1999; Newman, Leahy, Beck, & Reilly-Harrington, 2002). The results of cognitive therapy outcome trials in bipolar disorder have been mixed (Lam, Hayward, Watkins, Wright, & Sham, 2005; Scott et al., 2006), perhaps in part due to differences across samples. Regardless, as cognitive therapy becomes increasingly popular, it becomes important to document aspects of cognition that are disturbed among people with bipolar disorder. A better understanding of the cognitive variables involved in this disorder should help refine treatment approaches.

Correspondence concerning this article should be addressed to Lori R. Eisner, Department of Psychology, University of Miami, Coral Gables, FL 33124-0751. E-mail: leisner@psy.miami.edu.

Much of the literature on cognition in bipolar disorder focuses on variables that have been associated with unipolar depression. Research has demonstrated that people with bipolar disorder show maladaptive negative cognitive styles on a broad range of measures, including dysfunctional attitudes, in particular "need for approval" and "perfectionism" scales (Johnson & Fingerhut, 2004; Lam, Wright, & Smith, 2004; Reilly-Harrington, Alloy, Fresco, & Whitehouse, 1999; Scott, Stanton, Garland, & Ferrier, 2000; Wright, Lam, & Newsom-Davis, 2005), self-blaming attributions for negative life events (Winters & Neale, 1985), negative automatic thoughts (Hollon, Kendall, & Lumry, 1986), and on measures of attentional interference from negative words (Bentall & Thompson, 1990; French, Richards, & Scholfield, 1996). In addition, when compared to control participants, patients with bipolar disorder showed significantly greater over-general recall on an autobiographical memory test and significantly less ability to generate solutions to social problem-solving tasks (Scott et al., 2000). Thus, a good deal of evidence suggests that people with bipolar disorder display several types of negative cognitive patterns.

A number of studies suggest, however, that negative cognitive styles within bipolar disorder are associated with some form of depression. Subsyndromal depressive symptoms are often present for people with these disorders (Judd et al., 2003). The presence of depressive symptoms, even during some manic episodes, makes it difficult to disentangle the role of manic and depressive symptoms on cognitive styles (Bauer, Simon, Ludman, & Unutzer, 2005; Cassidy, Forest, Murry, & Carroll, 1998). Understanding the differential relationships of manic and depressive symptoms with cognition, though, is an important goal, as at least one out of five people with a history of mania report no episodes of depression (Kessler, Rubinow, Holmes, Abelson, & Zhao, 1997).

Evidence to date suggests that negative cognitive styles are higher among those with current or previous depressive symptoms. For example, current depressive symptoms are associated with a greater discrepancy between the actual and ideal self (Bentall, Kinderman, & Manson, 2005) and more negative rumination among persons at risk for bipolar disorder (Knowles, Tai, Christensen, & Bentall, 2005). Other findings indicate that during periods of depression, persons with bipolar disorder report low self-esteem (Ashworth, Blackburn, & McPherson, 1982; Scott & Pope, 2003), make negative attributions about events, and experience interference from negative words on the Stroop color naming task (Lyon, Startup, & Bentall, 1999) at levels that are comparable to those of people with unipolar depression. Similarly, Seligman et al. (1988) found that self-blaming attributions for failure correlated with severity of depression in both unipolar and bipolar depression. Prospective studies have also shown that negative cognitive styles predict increases in bipolar depressive symptoms over time (Alloy, Reilly-Harrington, Fresco, Whitehouse, & Zechmeister, 1999; Johnson & Fingerhut, 2004). Thus it is important to acknowledge that a previous history of depression or current depressive symptoms may account for cognitive patterns observed among persons who also have a history of mania. At the current time, it is not known whether such negative cognitive styles represent a true risk factor or are better conceptualized as a scar from previous depressive experiences (Akiskal, Hirschfeld, & Yerevanian, 1983).

Theories conflict regarding whether negative cognitive styles increase risk for mania. Some have suggested that mania might be related to positive cognitive styles, such as increases in confidence (Johnson, 2005). Research evidence indicates that manic symptoms are predicted by excessive reward pursuit, life events related to goal attainment (Johnson, 2005), and personality-congruent positive events (Francis-Raniere, Alloy, & Abramson, 2006). In contrast, one dominant theory from the psychoanalytic literature suggests that manic periods emerge as a defense or counteraction to depressive feelings and thoughts (Freeman, 1971). Hence, theories vary in the types of cognitive styles that are expected to be associated with manic symptoms.

Few studies are available to disentangle how negative cognitive styles are associated with hypomanic symptoms. In one such study, negative cognitive styles were examined among undergraduates with hypomania, with and without a history of depressive symptoms. Negative cognitive styles were found among those with a history of depressive symptoms but not among those with hypomania alone (Alloy et al., 1999).

The research is mixed as to whether negative cognitive styles predict increases in manic or hypomanic symptoms over time (Johnson & Fingerhut, 2004; Reilly-Harrington et al., 1999). In one study of college students, Reilly-Harrington et al. (1999) found that a negative cognitive style interacted with negative life events to predict increases in both depressive and hypomanic symptoms. However, other research suggests that increases in manic symptoms are not predicted by negative cognitions (Johnson & Fingerhut, 2004). In sum, research suggests that many of the cognitive risk variables for unipolar depression may be relevant to bipolar depression, but the relationship of negative cognitive styles to manic or hypomanic symptoms is less clear.

In the research reported here, we examined several cognitive variables that have only begun to be studied in bipolar disorder. As has been true of most research on cognitive variables in bipolar disorder, we began with tendencies that were linked to unipolar depression in previous research. Using the Attitudes Toward Self Scale (ATS; Carver & Ganellen, 1983), an instrument that has not yet been examined in bipolar disorder, we focused on the tendencies to hold very high standards, to be self-critical about failure to meet those standards, and to generalize from a specific failure to the overall sense of self-worth. These qualities have been related to concurrent depression levels in several studies (Carver & Ganellen, 1983; Carver, Ganellen, & Behar-Mitrani, 1985; Carver, La Voie, Kuhl, & Ganellen, 1988).

Of particular interest, research is consistent in showing that negative generalization predicts unique variance in depressive symptoms, even after controlling for self-criticism and high standards, and after controlling for other negative cognitive tendencies (see Carver et al., 1985). Other studies indicate that negative generalization prospectively predicts increases in depressive symptoms and instability in self-esteem in conjunction with negative events (Carver, 1998; Hayes, Harris, & Carver, 2004). We should be clear to distinguish negative generalization from over-general memory recall, which has been found to be elevated among people with bipolar disorder, depression, and posttraumatic stress disorder (Goddard, Dritschel, & Burton, 1996; McNally, Litz, Prassas, Shin, & Weathers, 1994; J. M. G. Williams & Broadbent, 1986). Generalization, in the following studies, is defined as thought processes following a specific event, whereas overgeneral memory describes the specificity of valenced memories. Given this distinction, the first goal of Study 1 was to determine whether bipolar disorder would be associated with negative generalization, high standards, or self-criticism.

A second goal was to consider previous findings that negative cognitive styles may not be related directly to mania but rather depend on a history of depression (Alloy et al., 1999). Thus, to disentangle the role of a history of depression versus a history of mania, we examined whether these cognitive tendencies among people with diagnosable bipolar spectrum disorders would be entirely attributable to a history of depression or current symptoms of depression. Given these goals, we recruited people with a history of bipolar spectrum disorders without depression, a history of bipolar spectrum disorders with depression, a history of depression alone, and no history of affective episodes. We considered history of mania or hypomania and history of depression separately in our analyses.

Study 1

Method

Participants—Participants were selected through a two-stage screening process. In the initial stage, over 2,400 University of Miami students were screened with the Hypomanic Personality Scale (HPS; Eckblad & Chapman, 1986) and the Inventory to Diagnose Depression— Lifetime Version (IDD–L; Zimmerman & Coryell, 1987). Both measures are described below. Ninety-three students who met the established cut-off for the HPS and 153 students who met the established cut-off for the IDD–L during the initial screening sessions were contacted by e-mail and invited to participate by signing up through a website that listed research opportunities. Other students, regardless of whether they met the cut-offs, were able to sign up for the study through the same website. All participants were administered the Structured Clinical Interview for *DSM–IV*, Version 2.0 (SCID-IV; First, Spitzer, Gibbon, & Williams, 1997). Participants who met lifetime criteria based on the SCID-IV for a history of mania or hypomania alone, a history of depression alone, a history of both mania or hypomania and depression, or no mood disorder (healthy control participants) were invited to participate in the study. Groups were formed without regard to initial pretesting scores on the HPS or IDD–L. Anyone who met diagnostic criteria for alcohol or substance abuse disorders was excluded from the study (n = 3). All participants received credit toward a course requirement in return for their participation.

The final sample consisted of 107 participants (66.3% female; mean age = 19.1, *SD* = 1.46). The majority of the sample was Caucasian (57.9%) or Hispanic/Latino (24.3%). Scores on the ATS subscales did not differ by ethnicity. Of the 107 participants, 44 had no history of mood disorders (by SCID-IV), 35 had a lifetime diagnosis of unipolar major depressive disorder, and 28 had a lifetime diagnosis of bipolar spectrum disorders, defined by some form of manic or hypomanic symptoms. Among those with a history of manic or hypomanic episodes, 15 were diagnosed with bipolar I disorder (BP I) on the basis of a history of mania. Seven were diagnosed with bipolar II disorder (BP II) on the basis of a history of hypomania and major depression, and 6 were diagnosed with bipolar disorder not otherwise specified (BP NOS) on the basis of a history of hypomania alone or cyclothymia. Within the bipolar spectrum group, 17 people reported a history of major depressive episodes, and 11 reported no history of major depressive episodes. Of participants meeting criteria for bipolar spectrum disorders, only 1 had been diagnosed previously by a psychologist or psychiatrist with bipolar disorder. The sample was largely untreated, with 2 participants taking lithium (1 for a condition other than bipolar disorder).[1]

Screening Measures

HPS: The HPS (Eckblad & Chapman, 1986) is a self-report questionnaire designed to identify people at risk for bipolar disorder by capturing episodic shifts in emotions, behavior, and energy. The HPS contains 48 true–false self-report items (i.e., "There have often been times when I had such an excess of energy that I felt little need to sleep at night," and "I often feel excited and happy for no apparent reason"). The HPS has been widely used in studies of risk for bipolar disorder. In the initial validation study, 78% of persons scoring more than two standard deviations above the mean were found to meet research diagnostic criteria for bipolar spectrum disorder, as compared to 0% in the control group defined by lower scores on the HPS (Eckblad & Chapman, 1986). In a prospective study, Kwapil et al. (2000) found that individuals with elevated scores on the HPS were at a heightened risk 13 years later for bipolar disorders meeting the criteria of the *Diagnostic and Statistical Manual of Mental Disorders* (4th ed.; *DSM–IV*; American Psychiatric Association, 1994). The HPS has high internal consistency

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[1]Other findings from a subset of this data set are reported in an unpublished manuscript that describes relations of bipolar disorder to ambitious expectations for the future (Johnson, Eisner, & Carver, 2006).

($\alpha = .87$) and good test–retest reliability 15 weeks later ($r = .81$) (Eckblad & Chapman, 1986). In this study, internal consistency was high ($\alpha = .87$, $N = 1,997$). On the basis of the established norms (Eckblad & Chapman, 1986), students who scored at least two standard deviations above the mean (35 or above; $n = 93$) on the HPS were invited by e-mail to take part in the study.

IDD–L: The IDD–L was used to assess lifetime depressive symptoms in the initial screening sessions (Zimmerman & Coryell, 1987). This 45-item scale includes probes designed to mirror the symptoms required for *DSM–IV* diagnoses of major depression. For each symptom endorsed, participants are asked whether the symptom lasted for at least 2 weeks. The IDD–L has been shown to have an overall rate of agreement of more than 97% with structured diagnostic interviews for depression (Zimmerman & Coryell, 1987). Internal consistency in this study ($\alpha = .93$) is similar to Zimmerman and Coryell's (1987)alpha of .92. Consistent with *DSM–IV* diagnostic criteria, participants who reported experiencing at least five symptoms for 2 weeks or longer ($n = 153$) were invited by e-mail to participate in the study.

Measures Administered at Individual Sessions

SCID-IV: The SCID-IV (First et al., 1997) is a diagnostic interview designed to assess the presence of current and lifetime Axis I disorders. Only modules to assess major depression, mania, hypomania, substance abuse, substance dependence, and psychosis were administered in this study. We did not assess for a history of minor depression. Interviews were conducted by graduate students and research assistants who received extensive training in diagnostic interviewing, including didactic material, role-playing sessions, and practice interviews. Before completing interviews for the study, all interviewers were trained until they achieved consistent reliability in their diagnoses of depression and mania. Regular reliability meetings were conducted throughout the study to review difficult cases for consensus diagnoses and to monitor against rater drift. The SCID-IV has demonstrated good test–retest reliability among trained interviewers (J. B. Williams et al., 1992). In this study, interrater reliability in a random sample of audio-taped interviews ($n = 16$) was high for the number of SCID-IV symptoms of mania or hypomania (intraclass $r = .98$), as well as for absolute agreement on dichotomous diagnoses of mania (intraclass $r = 1.00$), hypomania (intraclass $r = 1.00$), and depression (intraclass $r = .87$).

Cognitive tendencies: ATS (Carver & Ganellen, 1983), revised by Carver et al. (1988), is a self-report measure designed to capture three cognitive tendencies that draw on a self-regulation model of behavior and are considered to be potential vulnerabilities to depression: holding overly high standards (e.g., "Compared to other people, I expect a lot from myself"), being self-critical in response to failure (e.g., "I get angry with myself if my efforts don't lead to the results I wanted"), and generalizing from failure to the broader sense of self-worth (e.g., "If I notice one fault of mine, it makes me think about my other faults"). The subscales were established by confirmatory factor analytic procedures, and their brevity reflects the straightforwardness of each cognitive tendency (Carver et al., 1988). The revised ATS subscales for high standards and self-criticism each contain three items, and the subscale for generalization contains four items. All items were rated from 1 (*I agree a lot*) to 5 (*I disagree a lot*). In the sample of Study 1, alphas were adequate for High Standards (.75), Self-Criticism (.69), and Generalization (.79). In this sample, Self-Criticism correlated with Generalization ($r = .51$, $p < .001$), and modestly correlated with High Standards ($r = .20$, $p < .04$), but the correlation between High Standards and Generalization was not significant ($r = .15$).

Current symptoms: Two well-validated self-reports were used to assess current symptom severity. Both the 20-item Center for Epidemiological Studies—Depression Scale (CES–D; Radloff, 1977) and the five-item Self-Rating Mania Scale (SRM; Altman, Hedeker, Peterson,

& Davis, 1997, 2001) have strong correlations with measures of symptoms as assessed by clinical interview. In this study, alpha was .75 for CES–D, and alpha for SRM was .71. Symptoms were within a mild range (SRM $M = 5.11$, $SD = 3.29$, possible range = 0–20; CES–D $M = 19.78$, $SD = 6.56$, possible range = 0–60).

Procedure—Participants attended individual sessions, where they were assured that all study-related information would be confidential. After completing the written informed-consent procedures (none declined), participants then completed a diagnostic interview and questionnaires. After completing those measures, participants completed several computer tasks that are not relevant to this report.

Results

Before conducting primary analyses, we examined correlations among the scales relating to mood disorder. As would be expected, lifetime history of depression (SCID-IV) and current depressive symptoms (CES–D) correlated positively ($r = .35$, $p < .001$), as did lifetime history of mania (SCID-IV) and current manic symptoms (SRM), $r = .34$, $p < .001$. History of mania also correlated with current depressive symptoms ($r = .39$, $p < .001$). Current symptoms of mania and depression were not correlated, nor were measures of lifetime history of mania and lifetime history of depression.

Next, three two-way analyses of variance (ANOVAs) were conducted, with lifetime history of mania and lifetime history of depression as independent variables, and high standards, self-criticism, and generalization as dependent variables (see Table 1). There was no main effect or interaction on high standards. For self-criticism there was a significant main effect for a history of mania, $F(1, 103) = 5.86$, $p = .017$, partial $\eta^2 = .054$, with no other significant effect. For generalization, there was a significant main effect for a history of mania, $F(1, 103) = 3.90$, $p = .05$, partial $\eta^2 = .037$, and a significant main effect for a history of depression, $F(1, 103) = 8.44$, $p = .004$, $\eta^2 = .076$, but the interaction was not significant.

Current Symptoms—To examine the role of current symptoms of mania and depression, we computed correlations between symptom measures of mania (SRM) and depression (CES–D) and the ATS scales (across the entire sample). Consistent with previous studies, all three ATS scales, particularly generalization, correlated substantially with current depression symptoms: high standards $r = .33$, self-criticism $r = .32$, generalization $r = .48$. Only the correlation with self-criticism was significant for manic symptoms ($r = .20$).

Because generalization related strongly to depressive symptoms, and because depressive symptoms were common both among persons diagnosed with bipolar spectrum disorders and among persons diagnosed with major depression, we conducted further analyses to determine the role of depressive symptoms in the initial ANOVAs.

These additional analyses repeated the initial ANOVAs but included CES–D scores as a covariate. After accounting for CES–D in the prediction of self-criticism, the main effect for a history of mania was no longer significant, $F(1, 102) = 1.74$, $p = .19$. After accounting for CES–D in the prediction of generalization, the main effect for a history of mania was no longer significant, $F(1, 102) = 0.128$, $p = .72$; but the effect for a history of depression remained significant, $F(1, 102) = 4.80$, $p = .03$. These findings suggest that the elevated levels of self-criticism and generalization among people with bipolar spectrum disorders were attributable to subsyndromal depressive symptoms.

Potential Confounds—Finally, we examined potential confounds, such as age, gender, and bipolar spectrum subtypes. A history of mania was associated with age, $F(1, 98) = 4.59$, $p = .04$, and with gender, $\chi^2(1, N = 106) = 6.32$, $p = .012$. Gender was significantly correlated with

generalization ($r = .28$, $p = .004$), and age was significantly correlated with self-criticism ($r = .21$, $p = .04$).

To examine the effects of age on self-criticism, we conducted an analysis of covariance (ANCOVA) that included age and CES–D as covariates, as well as history of mania and history of depression as independent variables. After including CES–D in the model, age was no longer a significant predictor of self-criticism, $F(1, 96) = 2.51$, $p = .12$. We carried out a similar analysis to examine the effect of gender on generalization. That is, an ANCOVA was conducted that included gender and CESD as covariates, as well as history of mania or hypomania and history of depression as independent variables. Gender was not significant, $F(1, 100) = 1.95$, $p = .17$. Findings of these analyses were entirely comparable to analyses controlling only for CES–D. Most important, the effect of mania history was not significant in either analysis. That is, after controlling for the effects of age, gender, and CES–D, the elevated levels of self-criticism and generalization among people with a history of mania were attributable to subsyndromal depressive symptoms.

In an exploratory analysis, we conducted three one-way ANOVAs to examine whether the type of bipolar diagnosis (BP I, BP II, or BP NOS) was related to the ATS. The only scale where groups differed significantly was High Standards, $F(2, 25) = 4.19$, $p = .03$. An examination of group means revealed that the BP NOS group scored lower ($M = 11.00$, $SD = 2.76$) on the measure of High Standards than either the BP I group ($M = 13.33$, $SD = 1.54$), $t(25) = 2.59$, $p = .02$; or the BP II group ($M = 13.71$, $SD = 1.60$), $t(25) = -2.62$, $p = .02$. The BP I and the BP II groups did not differ from each other, $t(25) = -0.45$, $p = .66$. After excluding the BP NOS group from analyses, no group differences emerged on the High Standards scale, consistent with above findings.

Discussion

The goal of Study 1 was to assess whether bipolar disorder was associated with three cognitive tendencies related to unipolar depression: high standards, self-criticism, and negative generalization. Consistent with several previous findings, people with a history of depression had higher generalization scores than people without a history of depression. People with a history of mania or hypomania had higher self-criticism and generalization scores than did people without a history of mania or hypomania. After controlling for current depressive symptoms, however, the effects of history of mania or hypomania with self-criticism and generalization were no longer significant. This appears to indicate that the elevated levels of self-criticism and generalization within the bipolar spectrum sample were entirely attributable to current depressive symptoms.

It is noteworthy that the control for current depressive symptoms did not eliminate the effect of depression history in predicting generalization. This finding appears to suggest that negative generalization as a cognitive tendency is not merely a correlate of current depressive symptoms, but also is associated with either a depressive vulnerability or a depression scar. In any case, the fact that this association remained significant after controlling for current depressive symptoms represents a sharp contrast to what happened to the associations for mania.

There is one aspect of these findings that deserves further mention. Specifically, there was no association between history of mania and reports of maintaining high standards. On the face of it, this appears to conflict with evidence that vulnerability to mania is associated with having high goals and expectations of several sorts, including wealth and popular fame (Johnson & Carver, 2006; Johnson, Eisner, & Carver, 2006). Our interpretation is that persons reporting the latter tendencies (such as earning 10 million dollars) do not think of them as representing high standards for themselves, although objectively they are. The ATS items, in contrast,

explicitly refer to mental comparisons with "other people." People with a history of mania or hypomania may set high standards without considering normative reference points.

Study 2

The cognitive factors examined in Study 1 were not associated with a history of mania or hypomania after accounting for depressive symptoms. This is consistent with the previous evidence that many variables that predict bipolar depression do not predict mania (Johnson, Meyer, Winett, & Small, 2000; Johnson, Sandrow, et al., 2000; Johnson, Winett, Meyer, Greenhouse, & Miller, 1999). Are there other cognitive variables that might be associated with a history of mania, which have thus far been overlooked?

There are some hints in the existing literature. Mood has been shown to influence the valence of autobiographical recall in bipolar disorder. Specifically, during manic periods, people appear to have increased ability to recall positive memories in their life (Eich, Macaulay, & Lam, 1997). It has also been proposed that bipolar disorder is the result of a dysregulated behavioral activation system, a system hypothesized to be related to goal attainment behavior, reward seeking, and positive affect (Depue & Iacono, 1989). Thus individuals at risk for mania become activated in the face of possible challenging and rewarding internal stimuli (such as thoughts) and external stimuli (Depue & Iacono, 1989; Meyer & Hofmann, 2005). Several studies have found that risk for mania relates to increases in confidence after positive outcomes (Johnson, Ruggero, & Carver, 2005; Stern & Berrenberg, 1979). A history of mania also appears to be associated with high aspirations for financial and popular success (Johnson & Carver, 2006; Johnson et al., 2006). Indeed, there is a good deal of theory that ties manic vulnerability to the active pursuit of incentives (Johnson, 2005). The evidence for elevations in confidence following positive outcomes and reward responsivity among people with bipolar disorder suggests that cognitive tendencies relevant to mania may be seen in reactions to success (Depue & Iacono, 1989; Johnson, 2005).

This line of reasoning, taken together with previous findings, led us to the following possibility. If negative generalization in response to failure is a correlate of depressive symptoms and depression history within bipolar disorder, perhaps there is an analogous tendency that occurs in response to success, which relates instead to manic vulnerability.

Accordingly, for Study 2 we constructed a measure to assess positive generalization, the tendency to generalize from a good experience in one domain of life to broader aspects of life. We then examined the relationship between that measure and measures of risk for mania and a history of depression. This study was a preliminary assessment of whether positive generalization is related to a continuous measure of risk for mania. For this reason, we did not conduct diagnostic interviews. We hypothesized that the tendency to generalize from a good experience would be related to risk for mania, even after controlling for current symptoms of depression and mania.

Method

Participants were 276 students at the University of Miami (66% female) with an average age of 19.04 (*SD* = 1.43). Ethnicity information was not collected in connection with responses to the measures in Study 2, but we have no reason to believe that the sample differed materially from the University of Miami's ethnically diverse student body, which is approximately 23% Hispanic, 6% African American, 8% Asian, 55% non-Hispanic White, and 7% "other." All questionnaires were administered in large group sessions during the 1st week of the semester in partial fulfillment of a course requirement.

Measures Relating to Mood Disorders—As measures of risk for mania and history of depression, we administered the scales that were used for screening in Study 1. In this sample, the mean for the HPS was 19.32 (*SD* = 8.27; α = .83); the mean for the IDD–L was 12.26 (*SD* = 16.33; α = .93). We also measured current symptoms of both mania and depression to test whether any association of risk for mania or history of depression with other measures depended on the presence of symptoms. In this sample, the mean of the SRM was 4.64 (*SD* = 3.85; α = .79). The measure of depression symptoms was the short form of the Beck Depression Inventory (BDI; Beck, Rial, & Rickels, 1974). In this sample, the mean for the BDI was 3.35 (*SD* = 3.93; α = .83).

Positive Generalization—To investigate positive generalization, we created a set of items based loosely on the items from the ATS that measure negative generalization. Thus, each new item refers to a positive outcome, and then portrays a generalization from that positive outcome to the respondent's broader sense of self (see Table 2). We attempted to sample somewhat more broadly from the potential domain, however, than do the ATS negative generalization items. Some of the items refer to unspecified successes or good outcomes (as the ATS items refer to unspecified failures or bad outcomes); others refer to specific kinds of good outcomes. Most of the new items pertain to generalizing "laterally"—that is, from a good outcome in one domain to positive outcomes in other areas of life or life in general. However, a few items pertained to generalization "upward" from one good outcome to a more expansive outcome in the same general domain. We also wrote a couple of items targeting generalization of explicitly social outcomes. All items are first-person statements. The response range was from 1 (*I disagree with the statement a lot*) to 4 (*I agree with the statement a lot*).

Before conducting Study 2, items were administered to a distinct sample of 385 students to test the scale structure. Principal components analysis with oblimin rotation yielded three factors, which together accounted for 54% of the variance in item responding (see Table 2). The first factor had loadings from eight items, all but one of which represented lateral generalization from a particular outcome to other areas of life or to life in general. The only exception was an item that generalized from the first test in a course to the eventual grade in the course. The second factor had loadings from three items, all concerning upward generalization to more lofty goals in the same domain. The third factor had loadings on the two items dealing specifically with social outcomes. Scale scores were computed by averaging items, thus placing the score on the same metric as the item responses. Descriptive statistics for this measure, which we dubbed POG (for positive over-generalization), are in Table 2, along with the scale items.

The factor scores were modest though significantly correlated with each other (*p* < .01): lateral with upward generalization *r* = .17, and with social generalization *r* = .26; upward with social generalization *r* = .24. Scale scores were also significantly correlated (*p* < .001): lateral with upward generalization *r* = .26, and with social generalization *r* = .38; upward with social generalization *r* = .32. There were also significant gender differences in mean response levels. Men reported substantially higher tendencies to generalize from one positive social encounter (*M* = 2.19, *SD* = 0.63) than did women (*M* = 1.87, *SD* = 0.67), *F*(1, 273) = 14.70, *p* < .001; similar tendencies toward higher responses on the other factors were weaker, though significant: *F*(1, 274) = 5.70, *p* < .02, for upward generalization; *F*(1, 274) = 4.98, *p* < .03, for lateral generalization.

Results

Preliminary analyses determined that gender did not interact with any predictor variable (i.e., current manic and depressive symptoms, lifetime risk for mania, and history of depression) to moderate the prediction of any outcome variable (scores on each positive generalization scale);

thus the analyses reported are combined across gender. Before conducting primary analyses, we also examined the correlations between the scales that are associated with mood symptoms. As expected, lifetime depression symptoms and current depression symptoms correlated positively ($r = .41$, $p < .001$), as did risk for mania and current hypomanic symptoms ($r = .30$, $p < .001$). Current manic and depression symptoms correlated inversely ($r = -.22$, $p < .01$). The HPS and IDD–L correlated positively ($r = .17$, $p < .01$).

We then conducted three hierarchical multiple regression analyses to test prediction of each positive generalization scale from the measures of current manic and depressive symptoms (Block 1), the measure of lifetime risk for mania and the measure of history of depression (Block 2), and the interaction between those two variables (computed as the product of the centered variables; Block 3). In these analyses, current symptoms did not predict any of the three generalization scales. The closest was a tendency for manic symptoms to be associated with lateral generalization at the $p < .10$ level. History of depression did not predict any generalization scale (all $ps > .50$), nor did the interaction between depression history and risk for mania (all $ps > .75$). The only significant individual predictor in each analysis was risk for mania, which significantly predicted social generalization, $\beta = .18$, $t(248) = 2.69$, $p < .009$; upward generalization, $\beta = .35$, $t(248) = 5.38$, $p < .001$; and lateral generalization, $\beta = .17$, $t(248) = 2.52$, $p < .02$.

Finally, to determine whether the associations of HPS with the three POG scales were independent associations or instead reflect the shared variance among POG scales, we conducted a multiple regression analysis. In this regression model we predicted HPS scores from manic and depression symptom scores, depression history, and all three POG scales. These variables as a group accounted for 26% of the variance in HPS scores. Three variables made independent contributions to prediction: depression history, manic symptoms, and upward positive generalization, $\beta = .27$, $t(247) = 4.63$, $p < .001$.

Discussion

In Study 2, we developed a scale to measure positive generalization. Factor analysis yielded three subscales—social, upward, and lateral generalization. Current symptoms and depression history were not associated with any of the generalization scales. Risk for mania was significantly associated with all three subscales, and particularly strongly to upward generalization. Indeed, of the positive generalization subscales, only upward generalization was uniquely associated with high scores on the HPS. Hence, a tendency toward grandiose increases in confidence after small successes is associated with risk for mania. This is consistent with previous findings that people at risk for mania may have an overly positive cognitive style (Jones, Mansell, & Waller, 2006; Lam, Wright, & Sham, 2005).

A goal of future research should be to conjointly study the various measures of reward sensitivity and positive cognitive styles that have been found to be related to manic symptoms. Given the preliminary nature of this study, future research in this area should examine whether these findings can be replicated among persons diagnosed with bipolar spectrum disorders. Finally, more work should be conducted to examine whether positive cognitive styles can predict heterogeneous manic symptoms, or are related strictly to euphoric manic symptoms.

General Discussion

Before considering implications of the current research, we should acknowledge some limitations. First, this research relied on self-reports of cognitive tendencies. It is important to determine whether the processes that participants reported can be observed with behavioral laboratory paradigms. A second concern is that the undergraduate participants in each of the samples are likely to be high functioning; thus it might have been useful to assess for minor

depression in addition to major depression. Also, given their high functionality, they may not be comparable to clinical samples. It is important to assess whether the tendencies observed here can be observed in more severely affected samples. This is a particularly important issue in interpreting the findings of Study 2, which did not include a diagnostic measure. Study 1 also was limited by low statistical power, particularly for testing interactions of depression history and mania history, which would have needed more than 125 participants per cell to obtain adequate (80%) power to detect the very small effect sizes observed for interaction terms within this study. Perhaps most important, the cross-sectional designs do not allow us to examine whether generalization predicts change in symptoms over time. Thus, we know that generalization relates to symptoms, but we do not know that it confers risk for more severe symptoms over time.

Despite these limitations, the findings appear to open a new window into understanding cognitive patterns in bipolar disorder. That is, findings from both studies suggest that people with bipolar spectrum disorders, like those with unipolar depression, experience small incidents as having broader meaning for their self-worth. The nature of that generalization response and the circumstances under which it occurs differ according to the person's history and current symptoms. Yet both kinds of generalization represent apparent overreaction to specific event types.

Some readers may have noted a degree of similarity between our items reflecting generalization and items from other sources reflecting global attributions for outcomes of either negative or positive valence. It may be worth devoting brief mention to the potential link between the constructs under study here and the attributional construct. The relationship between constructs is actually more subtle than may appear at first. Global attributions are literally the inference that the same causal force applies to outcomes in widely diverse domains. Such an attribution may indeed lead to expectations (of good or bad outcomes), provided the implications of the attribution are followed mentally. In contrast, generalization involves applying the outcome's valence more broadly to other domains of action. This may entail attribution, but it may not.

The link between global negative attribution and negative generalization, and the links between both of these and depression, have also been examined empirically. That study (Carver et al., 1985) found a correlation of only .26 between negative generalization and global attribution for negative outcomes (assessed by the Attributional Style Questionnaire; Peterson et al., 1982), consistent with the position that the constructs are not very closely aligned. Of perhaps greater interest, generalization was a far more robust correlate of depression than was global attribution. Partialing out globality had virtually no effect on the correlation between generalization and BDI scores, but partialing generalization reduced the correlation of globality with BDI by nearly two thirds. Those findings suggest that generalization per se, rather than attribution, is the core of the link between generalization and mood-related outcomes reported here.

Divergent Effects

A particularly important aspect of these findings is that they add further support for the position that different variables are associated with depressive symptoms and vulnerabilities versus manic symptoms and vulnerabilities. Negative generalization was associated with a history of depression and bipolar depressive symptoms but not with a history of manic or hypomanic symptoms after controlling for current depressive symptoms. Positive generalization was specifically associated with risk for mania but not with depression history or symptoms of depression. The relationship with manic risk remained robust even when controlling for current symptoms of mania and depression.

As a group, these findings join evidence from a number of other studies indicating that measures of negative cognitive tendencies are relevant to bipolar depression (Hollon et al., 1986; Lyon et al., 1999; Reilly-Harrington et al., 1999; Seligman et al., 1988). They also concur with some but not all previous research in indicating that the negative cognitive tendencies are not associated with the manic aspect of bipolar disorder. Previous research suggests that a hypomanic state may be tied to a tendency to set elevated goals (Johnson et al., 2005). However, Study 2 provides the first evidence of a tendency to extrapolate from specific isolated events to broader expectations for the future.

It is also of some interest that the facet of positive generalization that related most strongly to manic risk in Study 2 was the scale pertaining to generalization "upward." Each of the items of that scale refers to how a particular positive event makes the respondent think about being a larger success in the same domain (see Table 2). Indeed, it is easy to read those items as suggesting that the positive experience suggests a goal for the future. It is also of interest that all those items seem to suggest a degree of public visibility or fame. These qualities suggest some commonality between this generalization tendency and both the tendency to raise aspirations after success (Johnson et al., 2005) and the tendency to hold high aspirations for popular fame (Johnson & Carver, 2006).

Although these findings were not based on a clinical sample, there is evidence that overly positive cognition is seen in clinical mania. It has been shown that individuals with a clinical diagnosis of bipolar disorder interpret hypomania-relevant experiences in an overly confident way (Jones et al., 2006). Furthermore, unrealistic and extreme goal attainment beliefs characterize a subset of patients with bipolar disorder with a sense of "hyper-positive self" (Lam, Wright, & Sham, 2005). High scores on these beliefs predict a poorer response to traditional short-term cognitive therapy. This suggests that there is a need to gain a better understanding of extremely positive self-beliefs and their consequences to provide a research foundation for improving current cognitive therapies (Lam, Wright, & Sham, 2005).

In sum, current findings add to a growing literature documenting distinct facets of cognition tied to depression versus mania within bipolar disorder. Nonetheless, these findings must be considered preliminary, as it is important to study these variables in a clinical population with both self-report and laboratory paradigms to further clarify the differences in cognition during different mood states. Further prospective research is needed to examine whether cognitive responses to failure and success have implications for the course of depression and mania. Understanding these cognitive processes is essential to the development of successful intervention and treatment strategies.

Acknowledgments

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Table 1

Means and Standard Errors for Each Subscale of the ATS Separated by History of Mania and History of Depression, Study 1

| Subscale | No mania history | | | | Mania history | | | |
| | No depression history (n = 44) | | Depression history (n = 35) | | No depression history (n = 11) | | Depression history (n = 17) | |
	M	SE	M	SE	M	SE	M	SE
High standards	12.36	0.34	12.83	0.38	12.5	0.64	13.25	0.56
Self-criticism	11.46	0.31	11.77	0.35	12.25	0.59	13.18	0.51
Generalization	9.64	0.58	12.63	0.65	11.83	1.11	13.81	0.96

Note. ATS = Attitudes Toward Self Scale.

Table 2

Factor Loadings for Positive Generalization Items, Study 2

	Factor		
Item	**1**	**2**	**3**
Factor 1. Lateral Generalization ($M = 2.63$, $SD = 0.59$, α = .82)			
If I succeed at something, it makes me feel I will succeed in other areas as well.	.83		
When I succeed at something, it makes me think about successes in other areas of my life.	.80		−.38
When something good happens to me, it makes me expect good things in other parts of my life too.	.69		
Having one thing go right for me can change me from feeling just OK to seeing all the good in myself.	.67		
When one thing goes right, it makes me feel my possibilities are limitless.	.58		
If I get a good job after college, it would make me think that I'll be successful at all aspects of life.	.49		.37
If I do well on the first test, I'm certain I'll get a good grade in the course.	.47		
If I do well on a big test, I feel that I'll be a success at everything in life.	.42	.36	
Factor 2. Upward Generalization ($M = 1.68$, $SD = 0.64$, α = .60)			
If someone praises the way I express something, it makes me think of writing a book.		.87	
When people agree with me after I speak up in class, it makes me think about being in student government.		.66	
If I were to do well in my psych course, it would make me think of being a famous psychologist.		.62	
Factor 3. Social Generalization ($M = 1.98$, $SD = 0.67$, α = .51)			
When an attractive person smiles at me, I can tell it means s/he is hot for me.			.73
When I made my first friend here, I knew I'd be a big success socially.			68

Note. Cross-loadings less than .30 are not printed.