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Anxiety Comorbidity in Bipolar Spectrum Disorders: The Mediation Role of Perfectionism in Prospective Depressive Symptoms

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Abstract

Background—Bipolar spectrum disorders (BSDs) are highly comorbid with anxiety, which is associated with an extended duration and exacerbation of depressive symptoms. Unfortunately, the underlying mechanisms are not known. This study examined the role of maladaptive cognitive styles in the co-occurrence of BSDs and anxiety disorders and prediction of depressive symptoms.

Methods—Participants included 141 young adults (69.6% female, mean age= 20.24, SD= 2.11), in one of three groups: a BSD group (bipolar II, cyclothymia, n=48), a comorbid BSD/Anxiety group (n=50), and a demographically-matched healthy control group (n=43), who were followed prospectively. Participants completed the Cognitive Style Questionnaire (CSQ), Depressive Experiences Questionnaire (DEQ), Dysfunctional Attitudes Scale (DAS), Sociotropy Autonomy Scale (SAS), Halberstadt Mania Inventory (HMI) and Beck Depression Inventory (BDI) at the initial assessment. One year later, participants completed the BDI and HMI again to assess severity of depressive and hypomanic/manic symptoms.

Results—A Multivariate Analysis of Co-Variance (MANCOVA) revealed significant differences between the three groups on their DAS Perfectionism, DEQ Dependency, DEQ Self-Criticism, CSQ Negative, SAS Autonomy, and Time 2 BDI scores, with the BSD/Anxiety group scoring higher than the BSD only group on all measures except the CSQ. Preacher and Hayes' (2008) bootstrapping method was used to test for mediational effects of the significant cognitive style measures on depressive symptoms at follow-up. The 95% confidence intervals for the indirect effect of group on follow-up depressive symptoms through DAS Perfectionism did not include zero, indicating the presence of a significant mediating relationship for perfectionism.

Limitations—This study only used two waves of data; three waves of data would allow one to investigate the full causal effect of one variable on another. Further, a comorbid anxiety diagnosis consisted of any anxiety disorder. Further research should separate groups by their specific anxiety diagnoses; this could afford a more complete understanding of the effect of types of anxiety on prospective depressive symptoms.

Conclusions—After taking into account initial levels of depressive and hypomanic/manic symptoms, we found that those with BSD/anxiety comorbidity experienced more severe depressive symptoms, but not more severe hypomanic/manic symptoms. Further, their more severe prospective depressive symptoms are explained by a perfectionistic cognitive style.

Affective lability is a common feature of human emotion. When this fluctuation in mood becomes extreme, it is characteristic of a group of disorders known as bipolar spectrum disorders (BSDs). BSDs can range from the relatively mild, such as cyclothymia, which involves fluctuations between hypomanic and subthreshold depressive symptoms, to the most severe, bipolar I disorder (BD I), characterized by extreme highs (e.g., mania) and lows (e.g., major depression) of mood and behavior (Miklowitz & Johnson, 2006; Parker, McCraw & Fletcher, 2012). BSDs affect approximately 4.4% of the United States population (Merikangas et al., 2007) and are associated with many deleterious physical and interpersonal outcomes (Goodwin & Jamison, 2007). Suicidal ideation is common in BSDs (Simon et al., 2007), and 10–15% of individuals with BSD successfully carry out suicide attempts (Harrison & Barraclough, 1997; Angst et al., 2005). In addition, individuals with BSDs exhibit impairment in functioning, including high rates of divorce (Goodwin & Jamison, 2007) and substance abuse (Angst et al., 2002; Alloy et al., 2009b).

Mood disorders including BSDs commonly are comorbid with anxiety disorders in both clinical and epidemiological samples (Akiskal et al., 2006; McElroy et al. 2001; Zimmerman et al. 2002; Kessler et al. 2003; Goes et al. 2012). Approximately 74.9% of individuals with BD will meet diagnostic criteria for an anxiety disorder during their lifetime (Merikangas et al., 2007; Provencher, Guimond, & Hawke, 2012). Among those BD individuals who do meet diagnostic criteria for an anxiety disorder, social anxiety disorder, specific phobia, and generalized anxiety disorder (GAD) have the highest comorbidity rate with estimates of 37.8%, 35.5%, and 29.6%, respectively (Merikangas et al., 2007). The comorbidity between bipolar and anxiety disorders is associated with an exacerbation and extended duration of depressive symptoms (Simon et al., 2007; Goes et al., 2012; Coryell et al., 2012). Specifically, comorbidity with obsessive compulsive disorder (OCD), panic disorder (PD), and social phobia have been associated with more frequent suicidal ideation (Simon et al., 2007) and suicide attempts (Perroud et al., 2007; Saunders et al., 2012). Along with a more severe depressive course, comorbid individuals have been shown to display shorter euthymic periods (Simon et al., 2004; Saunders et al., 2012) and a longer duration of time to remission of affective episodes (Simon et al., 2004; Sala et al., 2012). Moreover, bipolar disorder individuals with comorbid panic-agoraphobia diagnoses have been found to experience a higher number of hypomanic episodes (Akiskal et al., 2006). Regarding the treatment of BSD with anxiety comorbidity, these individuals exhibit a poorer response to mood-stabilizing medications and greater risk of medication-induced mania (Henry et al., 2003; Pini et al., 2003; Sala et al., 2012). Given that those individuals who experience BSD/

anxiety comorbidity display worse symptom presentation and outcome than those with a BSD alone, one explanation may be that dysfunctional cognitive styles mediate this association.

Unfortunately, there is a dearth of knowledge as to the underlying mechanisms that may explain comorbidity between BSDs and anxiety. Inasmuch as they do co-occur, it is not unreasonable to postulate that they share common risk factors, specifically maladaptive cognitive styles. Cognitive or personality styles that have been associated with a vulnerability to both anxiety and BSDs include high levels of sociotropy and autonomy, dependency and self-criticism, as well as perfectionistic attitudes and negative inferential styles (Bögels and Zigterman, 2000; Alloy et al. 2009a; Alloy et al., 2012).

Sociotropy and autonomy describe personality characteristics or cognitive styles that, when extreme and dysfunctional, are vulnerability markers for depression (Beck, 1983). Sociotropy, which can also be thought of as interpersonal dependency, has been shown to be high in depressed individuals (Hirschfeld et al, 1983; Clark and Beck, 1991). Beck (1983) argued that a highly sociotropic individual not only aims to maintain close relationships, but also seeks the approval and acceptance of others. This type of individual is likely to exhibit depression when they are confronted with a deterioration of interpersonal relationships (e.g., divorce, moving away from a friend, etc). Conversely, an individual high in autonomy is one who invests in preserving independence, prefers solitary activities, and values work and achievement. Accordingly, failures in achievement or goal-directed behaviors (e.g., demotion, failure on an exam, etc.) are likely to lead to depression for highly autonomous individuals (Beck, 1983; Clark and Beck, 1991). Recent correlational studies have shown a link between sociotropy/autonomy and unipolar depression and anxiety (e.g., Sutton et al., 2011). Brenning and colleagues (2013) found that high levels of initial autonomy predicted depression prospectively. Similarly, high levels of sociotropic personality style predicted significant increases in symptoms of depression and anxiety (Alford and Gerrity, 1995; Masih et al, 2007). Brown et al. (1998) found that individuals high on autonomy scored higher on measures of social anxiety and general anxiety. In addition, autonomy is greater in BSD individuals than healthy controls and predicts onset of hypomanic/manic episodes (Alloy et al., 2009a). Thus, sociotropy and autonomy may help to explain BSD/anxiety comorbidity.

Another two negative cognitive styles similar to sociotropy and autonomy that, when dysfunctional, have been linked to high levels of depression are dependency and self-criticism (Blatt et al, 1976). Dependency can be thought of as a coping mechanism that is triggered to offset feelings of worthlessness and guilt, or as a function of needing support or feeling weak (Blatt et al., 1976). This construct manifests in approval- or affection-seeking behavior. Alternatively, self-critical individuals value their achievements, independence, and freedom from control by others, but measure their achievements based on very high internalized standards (Blatt, 1974; Blatt et al., 1976). However, their unreasonably high standards set them up for feelings of failure, disappointment, guilt, and self-blame.

It is worth noting that sociotropy and dependency and autonomy and self-criticism seem to be related constructs. Recent research has attempted to understand whether they represent

complementary dimensions of vulnerability. Shahar et al. (2008) demonstrated with confirmatory factor analysis that self-criticism, sociotropy, and dependency can be considered three dimensions that have a significant, positive association with depression. Simply put, these factors are the seminal cognitive styles that may predispose an individual to depression. Interestingly, these findings also have been replicated with symptoms of anxiety. Cohen et al. (2013) found that self-criticism predicted depressive symptoms, whereas dependency predicted social anxiety symptoms. Moreover, Alloy et al. (2009a) found that self-criticism is higher in individuals with BSD than healthy controls and that higher self-criticism also predicts onsets of hypomanic/manic episodes in BSD individuals.

In Beck's (1967, 1987) cognitive theory of depression, negative attitudes that an individual has towards oneself (e.g., "I'm stupid"), the outside world (e.g., "Everyone knows I'm stupid"), and one's future (e.g., "I'll always be stupid") are not only characteristics of depressed people, but also provide vulnerability to depression. These dysfunctional attitudes can be further described as perfectionistic, self-evaluative responses and beliefs that follow a negative life event in an if-then manner (e.g., "If someone I love doesn't love me, then I'm worthless"). Similarly, according to the Hopelessness Theory of depression (Abramson, Metalsky, & Alloy, 1989), negative inferential styles, which are comprised of the tendency to attribute stressful life events to stable and global causes, infer that negative consequences will follow from negative events, and infer that one is deficient or unworthy, also provide vulnerability to depression.

Longitudinal studies have shown that dysfunctional attitudes and negative inferential styles predict increases in depressive symptoms and first onset of major depressive episodes in unipolar samples, as well as depressive and hypomanic symptoms in bipolar spectrum samples (Alloy et al, 1999; 2006; Francis-Raniere, Alloy, & Abramson, 2006; Reilly-Harrington, Alloy, Fresco, & Whitehouse, 1999; Fresco et al., 2001; Alloy et al., 2012). In addition, dysfunctional attitudes and negative attributional styles have been found in anxious individuals (e.g., Heimberg et al., 1989; Sanz and Avia, 1994; Burns & Spangler, 2001). However, the extent to which dysfunctional attitudes and negative inferential styles are associated with comorbidity between anxiety and BSDs is not known.

The present study builds upon existing literature and evaluates the role of maladaptive cognitive styles (sociotropy/autonomy, dependency/self-criticism, dysfunctional attitudes, negative inferential style) in the comorbidity of anxiety and BSD. We hypothesized that: (i) individuals with comorbid BSD and anxiety disorders would have more maladaptive cognitive styles than individuals with BSD only and healthy controls, (ii) individuals with comorbid BSD and anxiety disorders would exhibit more severe depressive and hypomanic/manic symptoms prospectively than those with BSD alone, and (iii) the prospective association between comorbid BSD and anxiety and more severe depressive and hypomanic/manic symptoms would be mediated by maladaptive cognitive styles.

Methods

Participants and Procedures

Participants in this study were drawn from the Temple University site of the Longitudinal Investigation of Bipolar Spectrum Disorders (LIBS) Project. This project examined various risk factors that may influence the course of BSDs. A two-phase screening process was used to select the appropriate participants. In Phase I, approximately 7,500 individuals completed the General Behavior Inventory (GBI; Depue, Krauss, Spoont, & Arbisi, 1989). Based on the GBI cutoff score criteria (see measures), 12.3% of the sample was potentially eligible for the bipolar spectrum disorder (BSD) group, and 65% was potentially eligible for the healthy control group. Approximately 2 weeks to 4 months after Phase I, 684 potentially eligible individuals completed a lifetime diagnostic interview for Phase II screening.

In Phase II, inclusion criteria for the BSD group required a current or lifetime diagnosis of bipolar II disorder, cyclothymia, or bipolar disorder not otherwise specified (NOS), as determined by the Diagnostic and Statistical Manual of Mental Disorder, 4th Edition Text Revision (*DSM-IV-TR*; American Psychiatric Association, 2000) or Research Diagnostic Criteria (RDC; Spitzer, Endicott & Robins, 1978). The bipolar NOS diagnosis was given to individuals who had experienced one of three types of symptomatology: (a) hypomanic episode(s) but no diagnosable depressive episodes, (b) a cyclothymic mood pattern with periods of affective disturbance that did not meet frequency or duration criteria for hypomanic and depressive episodes, or (c) hypomanic and depressive episodes not meeting frequency criteria for a diagnosis of cyclothymia.

Participants were excluded from the BSD group if they had experienced a manic episode as defined by the *DSM-IV-TR* or RDC criteria, as this would indicate a bipolar I diagnosis. Participants with bipolar I disorder were excluded because a major goal of the LIBS project was to predict subsequent conversion to bipolar I (onset of manic episode). The control group had two exclusion criteria: (a) current or past diagnosis of any Axis I disorder, and (b) family history of a mood disorder. Of the 384 potential BSD group participants from Phase I, 137 (35.7%) met criteria for a BSD (47 with cyclothymia or bipolar NOS and 90 with bipolar II), and 127 of 300 potential control participants from Phase I (40.2%) met criteria for the healthy control group. The final sample consisted of a total of 220 participants, with BSD group participants matched with respect to gender, age, and ethnicity by the control group.

Of the 220 participants that qualified following the first two screening phases, 79 were excluded from the present analyses because they were missing some of the data needed for the present study. These 79 participants did not significantly differ from the remaining 141 participants on the basis of gender ($\chi^2[2] = .68, p = .71$), age ($t[2] = .06, p = .95$), ethnicity ($\chi^2[2] = 2.78, p = .60$), or bipolar spectrum diagnosis ($\chi^2[2] = 2.35, p = .31$). Thus, the final sample for this study included 98 in the BSD group (65.33% female) and 43 in the control group (68.18% female). Of the 98 BSD participants, 36% met criteria for cyclothymia or bipolar NOS (51.85% female) and 64% met criteria for bipolar II disorder (75% female). Additionally, for the present study's aims, 55% of the BSD group was allocated to a Bipolar/Anxiety (BSD/Anx) group on the basis of a comorbid lifetime anxiety diagnosis. Specific

comorbid anxiety diagnoses in the BSD/Anx group were DSM GAD 15.4%, RDC GAD 21.5%, DSM PD 6.2%, RDC PD 4.6%, DSM PTSD 30.8%, DSM OCD 18.5%, and DSM Anx NOS 3.1%

Thus, the final sample for this study included 48 participants in the BSD group, 50 in the BSD/Anx group, and 43 in the Control group. In the BSD group, 39% of the participants met RDC criteria for BDII, whereas 17% met *DSM-IV-TR* criteria. In the BSD/Anx group, 76.9% of the participants met RDC criteria for BDII, and 53.8% met *DSM-IV-TR* criteria. Prior to entering the study, all participants provided informed written consent. Consistent with the longitudinal nature of the study, all participants were asked to complete various measures of life events and symptoms every four months. Data included in this study were compiled from the first assessment, Time 1 (T1), and the one-year follow-up, Time 2 (T2).

Measures

General Behavior Inventory (GBI)—The GBI (Depue et al., 1989) is a self-report questionnaire used during the Phase I screening process to identify and distinguish between potential bipolar spectrum participants and controls. The GBI has been shown to be valid among a wide range of populations including undergraduates, psychiatric outpatients, and relatives of bipolar I probands (Depue et al, 1989; Klein, Depue, & Slater, 1985). Psychometric properties of the instrument are strong, with a reported internal consistency of α 's = 0.90–0.96, test-retest reliability of r 's = 0.71–0.74, good sensitivity (0.78), and excellent specificity (0.99) for BSDs (Depue et al., 1981, 1989). Discriminant validity also has been good (.88 in discriminating between those with and without affective disorders; Mallon, Klein, Bornstein, & Slater, 1986). The revised-GBI (Depue et al., 1989) utilized in the present study contains 73 items. Each item is designed to assess various experiences related to depressive, (hypo)manic, or biphasic symptoms, and how these experiences range on the dimensions of intensity, duration, and frequency. The respondent provides a rating on a 4-point Likert scale, ranging from 1 (not at all) to 4 (very often or almost constantly). Consistent with scoring by Depue and colleagues (1989), an item received a score of one point when rated as 3 (often) or 4 (very often or almost constantly) on the scale. Points were then summed to obtain two subscores: depression (GBI-D score) and (hypo)mania and biphasic (GBI-HB score). This scoring method provides GBI scores that represent the number of symptomatic experiences satisfying the criteria of duration, intensity, and frequency.

Based on Depue et al.'s (1989) findings, the following cutoff scores were used to identify potential bipolar spectrum and control participants: GBI-D score of ≥ 11 and GBI-HB score of ≥ 13 for potential bipolar spectrum participants; conversely, GBI-D scores < 11 and GBI-HB scores < 13 for healthy controls. A pilot study for the LIBS project validated this high-GBI and low-GBI group assignment procedure against diagnoses obtained via Schedule for Affective Disorders and Schizophrenia-Lifetime interviews (see Alloy et al., 2008).

Schedule for Affective Disorders and Schizophrenia-Lifetime (SADS-L)—The SADS-L (Endicott & Spitzer, 1978) is a semi-structured diagnostic interview with demonstrated reliability and validity to assess current and lifetime Axis I disorders. During

Phase II of the screening process, diagnostic interviews were conducted using an expanded version of the SADS-L (exp-SADS-L; Alloy et al., 2008). The exp-SADS-L assesses symptoms related to mood, anxiety, eating, psychotic, and substance use disorders over the lifetime, as well as their occurrence, duration, and severity. Modifications made for use in the LIBS study include: (a) additional probes to allow for the assignment of *DSM-IV-TR* as well as RDC diagnoses; (b) additional items inquiring about affective symptoms developed to better capture acute characteristics of episodes as well as frequency and duration of symptoms; and (c) additional sections on eating disorders, attention-deficit hyperactivity disorder, acute stress disorder, medical history, family history, and organic rule-out conditions (Alloy et al., 2008; 2012). All interviews were conducted by extensively trained interviewers who were blind to participants' Phase I GBI scores. In order to obtain consensus diagnoses and monitor inter-rater reliability, interviews were audiotaped. An expert psychiatric consultant was used as the third diagnostic tier for diagnostic consensus. Inter-rater reliability generated by this procedure was high: kappas for major depressive disorder diagnoses based on 80 jointly rated interviews were $\alpha > .95$, while an inter-rater reliability study based on 105 jointly rated interviews yielded $\alpha > .96$ for BSD diagnoses (Alloy et al., 2008).

Beck Depression Inventory (BDI)—The Beck Depression Inventory (BDI; Beck, Rush, Shaw, & Emery, 1979) is a 21-item self-report inventory that assesses the presence and severity of cognitive, motivational, affective, and somatic symptoms of depression. For the current study, a four-month version of the BDI was used, in which participants rated their symptoms for each month in the four-month interval. Thus, we averaged across the monthly scores to obtain one score representing participants' depressive symptoms. The BDI has been shown to be valid in student samples (Bumberry, Oliver, & McClure, 1978; Hammen, 1980). Furthermore, in nonclinical populations, the internal reliability is good ($\alpha = .81$ to $.86$) and the test-retest reliability ranges from $.48$ to $.86$, depending on the interval between re-testing and type of population (Beck, Steer, & Garbin, 1988; Groth-Marnet, 1990). In this study, the BDI had an internal consistency of $\alpha = .94$. Participants completed the BDI at T1 and T2, a year later.

Halberstadt Mania Inventory (HMI)—The Halberstadt Mania Inventory (HMI; Alloy, Reilly-Harrington, Fresco, Whitehouse, & Zechmeister, 1999) is a 28-item self-report measure that assesses current (hypo)manic symptoms by covering cognitive, motivational, affective and somatic symptoms. The HMI was modeled after the BDI and has a similar format. The HMI was tested in a sample of approximately 1,282 undergraduates and had good psychometric properties, with high internal consistency ($\alpha = .82$) and adequate convergent validity ($r = .32$, $p = .001$) with the mania scale of the Minnesota Multiphasic Personality Inventory (MMPI) (Hathaway & McKinley, 1951). In addition, in the LIBS project, HMI scores correlated $r = .46$ with hypomanic/manic symptoms rated from the expanded SADS interview. Moreover, evidence of the construct validity of the HMI has been provided by Alloy et al. (1999; 2009). In this study, the HMI had an $\alpha = .83$.

Cognitive Style Questionnaire (CSQ)—The Cognitive Style Questionnaire (CSQ; Alloy et al., 2000), a modified version of the Attributional Style Questionnaire (Peterson et

al., 1982; Seligman et al., 1979), measures styles for inferring causes, consequences, and characteristics about the self when faced with negative or positive life events (Abramson, Metalsky, & Alloy, 1999). The ASQ is a well-established instrument with good reliability and validity (Peterson, 1991) that assesses one's attributions for hypothetical positive and negative events on three dimensions: internality, stability, and globality. The CSQ was modified by increasing the number of events to 12 positive and 12 negative events (6 achievement and 6 interpersonal events of each valence) and by adding ratings of consequences and implications for one's self of each event on 7-point scales. Ratings assessed the stability and globality of individuals' causal attributions for each event as well as their inferences about the probable consequences of each event (e.g., "How likely is it that the other person no longer wanting a romantic relationship with you will lead to other negative things happening to you?") and the implications of each event for the self (e.g., "To what degree does your receiving a negative evaluation of your job performance mean to you that you are flawed in some way?"). The CSQ has exhibited excellent reliability and validity (Haeffel et al., 2008), with an internal consistency of $\alpha = .88$ at T1.

Dysfunctional Attitudes Scale (DAS)—The DAS (Weissman & Beck, 1978) assesses maladaptive attitudes concerning perfectionist standards and concern about others' approval, etc. The LIBS Project used the 40-item version of the DAS Form A and added 24 items to better assess dysfunctional attitudes in the achievement and interpersonal domains. Using a 7-point Likert scale ranging from 'Totally agree' to 'Totally disagree', participants respond to descriptions of their attitudes most of the time. Factor analyses of the DAS have yielded two subscales, Approval by Others (AO – 10 items: e.g., "My value as a person depends greatly on what others think of me") and Performance Evaluation/Perfectionism (PE – 15 items: e.g., "If I fail partly, it is as bad as being a complete failure"). The DAS has demonstrated good construct validity (Alloy et al., 2000; Francis-Raniere et al., 2006; Segal, Gemar, & Williams, 1999) and at T1 had internal consistencies for the PE and AO subscales of $\alpha = .89$ and $.78$, respectively (Alloy et al., 2009a).

Depressive Experiences Questionnaire (DEQ)—The DEQ (Blatt et al., 1976) is a 66-item, self-report measure that measures depressive personality styles using 7-point Likert scales; responses range from strongly disagree to strongly agree. The DEQ is subdivided into three subscales: Dependency (e.g., "After an argument, I feel very lonely"), Self-Criticism (e.g., "Often, I feel as if I have disappointed others"), and Efficacy (e.g., "I am a very independent person"). The DEQ has yielded high internal and retest reliability (Blatt et al., 1976; Zuroff et al., 1983), as well as good construct validity (Zuroff et al., 2004). At T1, internal consistency for the Dependency and Self-Criticism subscales were α 's = $.64$ and $.87$, respectively (Alloy et al., 2009a). We did not use the Efficacy subscale in this study.

Sociotropy Autonomy Scale (SAS)—The SAS (Beck et al., 1983) is a 60-item questionnaire that assesses Beck's (1987) depressive personality modes: Sociotropy and Autonomy. Sociotropy measures fears of abandonment and rejection as well as the value of interpersonal relationships. Conversely, Autonomy assesses the value one places on achievement, independence, and goal-directed behavior. Each item is rated on 5-point scales (0%, 25%, 50%, 75%, and 100%). The Sociotropy scale has high concurrent validity with

numerous other measures of dependency and affiliation (Clark, Beck & Brown, 1992). The Autonomy scale is moderately correlated with another autonomy subscale, The Personality Research Form (Clark et al., 1992). The two different scales have good internal consistency ($\alpha = 0.90$ and 0.93 , respectively) and high retest reliability (Beck, et al., 1983; Zuroff et al., 2004). At T1, internal consistencies for Sociotropy and Autonomy were α 's $= .93$ and $.92$, respectively (Alloy et al., 2009a).

Data Analysis Approach—Initially, Pearson correlations were conducted to examine the associations between symptom levels (BDI and HMI scores) and cognitive style measures (CSQ, DAS, DEQ, and SAS; See Table 1). To test Hypotheses 1 and 2, a multivariate analysis of covariance (MANCOVA) was used to examine group differences in cognitive style measures and prospective symptomatology. This analytic technique was used because it allows for group comparisons on several related dependent measures at once, while controlling for confounds. Initial BDI and HMI symptom scores were covaried to insure that relationships between group status and cognitive styles and prospective symptoms could not be attributed to initial symptom state at T1. Further, in order to test Hypothesis 3, Hayes' (2012) Process model, involving bootstrapping (Preacher and Hayes, 2008), was used to test whether the association between comorbid BSD and anxiety and prospective BDI and/or HMI levels could be explained by any of the cognitive styles that differentiated the BSD/Anx group from the BSD only and control groups.

Results

Preliminary Analyses

First, a multivariate analysis of variance (MANOVA) was used to test whether gender or ethnicity were associated with any differences on the dependent variables of interest (DAS, DEQ, CSQ, SAS, BDI, and HMI). Wilks's statistic revealed that there was a significant multivariate effect of ethnicity on the dependent measures, $\Lambda = 0.38$, $F(4, 143) = 1.77$, $p < .01$. Specifically, the univariate ANOVAs revealed that ethnicity had a significant effect on: SAS Sociotropy, $F(4, 143) = 2.53$, $p < .05$, CSQ, $F(4, 143) = 2.53$, $p < .01$, DEQ Dependency, $F(4, 143) = 5.37$, $p < .01$, DAS Perfectionism, $F(4, 143) = 2.53$, $p < .01$, DAS Approval by Others, $F(4, 143) = 2.93$, $p < .05$, and T2 BDI, $F(4, 143) = 5.44$, $p < .01$. Consequently, ethnicity was used as a covariate in the main hypothesis testing analyses.

Table 1 displays the correlations between the cognitive style and T2 symptom dependent variables. As can be seen in the table, with the exception of SAS Autonomy, most of the other cognitive style measures exhibited significant moderate intercorrelations with each other. In addition, all of the cognitive styles except SAS Autonomy were significantly correlated with depressive symptoms (BDI) at T2, whereas none of the cognitive styles correlated with hypomanic symptoms (HMI) at T2.

Group Differences in Cognitive Styles and Symptoms (Hypotheses 1 and 2)

Controlling for Time 1 BDI and HMI symptom scores, as well as ethnicity, a Multivariate Analysis of Covariance (MANCOVA) was used to compare the BSD, BSD/Anx, and Control groups on the dependent variables: DAS Perfectionism, DAS Approval by Others,

DEQ Dependency, DEQ Self-Criticism, CSQ, SAS Sociotropy, SAS Autonomy all at T1, and BDI and HMI at one year follow-up (T2). Using Wilks' statistic, there was a significant multivariate effect of group on the dependent measures, $\Lambda = 0.52$, $F(2, 142) = 2.32$, $p < .01$. Further, the univariate ANCOVAs revealed significant differences between the three groups on: DAS Perfectionism, DEQ Dependency, DEQ Self-Criticism, SAS Autonomy, SAS Sociotropy, CSQ, and T2 BDI. The groups were not significantly different on DAS Approval by Others and T2 HMI (See Table 2). Although the multivariate test and follow-up univariate analyses inform us of the significance of overall group differences, which particular groups differed significantly from each other on each dependent variable was unclear.

In order to determine the specific group differences, a series of planned comparisons was conducted. A Bonferroni correction was used to adjust the significance level. Planned contrasts revealed that the BSD/Anx group scored higher than the BSD group on SAS Sociotropy, DEQ Dependency, DEQ Self-Criticism, DAS Perfectionism, and T2 BDI (See Table 3). Further, the BSD/Anx group scored higher than the Control group on SAS Sociotropy, SAS Autonomy, CSQ, DAS Perfectionism, DAS Approval by Others, and T2 BDI. Planned contrasts revealed no group differences on DEQ Dependency and T2 HMI (See Table 4). These observed group differences are meaningful because the interval boundaries do not cross zero.

Cognitive Styles as Mediators of the Association Between Bipolar-Anxiety Comorbidity and Prospective Symptoms

Hayes' (2012) Process was used to test for mediational effects of SAS Sociotropy, DEQ Dependency, DEQ Self-Criticism, and DAS Perfectionism on the positive relationship between BSD/Anx group and higher prospective depressive symptoms. Group (BSD or BSD/Anx) was entered as the independent variable, with T2 BDI entered as the dependent variable. Ethnicity and T1 BDI were entered as covariates. SAS Sociotropy, DEQ Dependency, DEQ Self-Criticism, and DAS Perfectionism were entered as possible mediators. The 95% confidence intervals for the indirect effect of group on T2 depressive symptoms through DAS Perfectionism did not include zero, indicating the presence of a significant mediating relationship. The 95% confidence intervals for the indirect effect of group on T2 depressive symptoms through SAS Sociotropy, DEQ Dependency, and DEQ Self-Criticism did include zero, indicating no significant mediating relationships for these other cognitive styles (See Table 5).

Discussion

Researchers have attempted to understand why comorbidity between mood and anxiety disorders results in more deleterious outcomes than mood disorders alone. Even after taking into account initial levels of depressive and hypomanic/manic symptoms, we found that those with BSD/anxiety comorbidity experienced more severe depressive symptoms, but not more severe hypomanic/manic symptoms, over a one-year follow-up. The results of the present analyses also indicated quite clearly that individuals with BSD/anxiety comorbidity interpreted their environments with cognitive styles that are more negative than those with

BSDs only or healthy controls. These cognitive styles were characterized by more extreme sociotropy, dependency, self-criticism, and perfectionism. However, only perfectionistic attitudes mediated the association between BSD and anxiety comorbidity and increased depressive symptoms at one-year follow-up.

In addition to the evidence that BSD/anxiety comorbidity results in exacerbated depressive symptoms over time, we found that a certain cognitive style contributes to this worse depressive course, specifically, a depressive style grounded in high perfectionism. Individuals with both a BSD and anxiety diagnosis engaged in more perfectionistic thinking than individuals with a BSD only. This perfectionistic thinking style engendered more severe depressive symptomatology. This study is relatively unique in that, to date, little research has been conducted on the possible mechanisms that underlie the more negative course of disorder associated with bipolar-anxiety comorbidity.

Perfectionism may be especially likely to mediate the comorbidity-depression relationship because of its integral association with both anxiety and depression. Perfectionism has been implicated in the development and maintenance of various anxiety disorders (Antony et al., 1998). Specifically, cognitive theories of obsessive compulsive disorder (OCD) assert that perfectionistic thinking underlies one's obsessions. These theories have been supported by Frost and Steketee (1997) and later applied to panic disorder (Antony and Barlow, 1996). Individuals with panic disorder endorsed higher scores on measures that assessed perfectionism and concern about one's mistakes than non-anxious controls (Antony et al., 1992; Antony and Barlow, 1996; Antony et al., 1998). Similarly, perfectionistic thinking has been shown to be present in depressed (Kawamura et al., 2001) and BSD individuals (Scott et al., 2000). Moreover, perfectionism consistently has been associated with severe depressive symptoms (Hewitt and Flett, 1990; Hewitt and Flett, 1991; Cox, and Enns, 2003). Given previous research on perfectionism, the finding that it mediated the BSD/anxiety comorbidity- worse depressive symptom relationship is not surprising.

Interestingly, BSD/anxiety comorbidity did not seem to lead to worse (hypo)manic symptoms in our study. Although these results are in line with most of the literature (Simon et al., 2004; Otto et al., 2006; Simon et al., 2007), Akiskal et al. (2006) found that panic-agoraphobia comorbidity was associated with more frequent hypomanic episodes. To date, there is not a clear understanding of why manic/hypomanic symptoms sometimes are and sometimes are not aggravated by BSD/anxiety comorbidity. Future research should seek to understand the conditions under which manic/hypomanic outcomes are affected.

This study is consistent with the research of Simon and colleagues (2007) that comorbid anxiety disorders among individuals with bipolar disorder stimulate worse depressive symptoms. Moreover, our results are consistent with previous literature that demonstrates that dysfunctional cognitive styles are observed in BSD individuals (Alloy et al., 2009a). Earlier work by Burns and Spangler (2001) and Sanz and Avia (1994) demonstrated that both depressed and anxious individuals endorse distinct negative cognitive styles. Expanding on these findings, the present study illustrates the negative cognitive styles that are even more extreme in individuals who exhibit *both* BSDs *and* anxiety disorders. Additionally, the results of the present study clarify work by Simon et al. (2007), Goes et al. (2012), and

Coryell et al. (2012) by providing a more detailed explanation for the processes by which comorbidity produces depressive exacerbation.

Among the strengths of this study were the relatively large and equal sample sizes of the three groups of participants, the inclusion of demographically matched controls, the examination of a number of cognitive styles previously associated with depression and anxiety, and the prediction of prospective mood symptoms. These qualities afforded an ability to measure the impact of anxiety comorbidity on depressive symptoms as well as some of the cognitive mechanisms that may help to explain this impact. Despite these strengths, the study had several limitations. First, although this study was longitudinal, there were only two waves of data. It would be more advantageous to use three waves of data as it would allow one to investigate the full causal effect of one variable on another (Cole and Maxwell, 2003). Second, in this study, a comorbid anxiety diagnosis consisted of any *DSM-IV-TR* or RDC anxiety diagnosis. If individuals were separated by their specific anxiety diagnoses, this could afford a more complete understanding of the effect of types of anxiety on prospective depressive symptoms. However, a much larger sample size would be needed to do this. A similar criticism is relevant to the bipolar groups. The groups were comprised of participants who met criteria for any BSD except Bipolar I. In order to examine unique effects of comorbidity on BSDs, future research should use groups that are strictly separated by diagnosis (e.g., cyclothymia, BD II, BD I). Another limitation is that we only examined the effects of anxiety comorbidity on the course of BSDs for self-reported depressive and hypomanic/manic symptoms. Future research should examine whether maladaptive cognitive styles also help to account for the effects of anxiety comorbidity on BSD individuals' suicidality, functional impairment, and diagnosed mood episode onset.

Perhaps the most important lesson to be learned from this study is that a depressogenic cognitive style involving perfectionism leads to more severe depressive symptomatology. This distinctive cognitive style may be especially pronounced in individuals with bipolar and anxiety comorbidity and be one of the underlying mechanisms that contributes to individuals with BSD/Anx comorbidity experiencing more severe depressive symptoms. Future research should examine what, if any, anxiety-specific attitudes are adaptive in preventing an aggravation of hypo(manic) symptoms or episodes in individuals with both a bipolar and an anxiety disorder.

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Table 1

Dependent Variable Correlations

	SAS Soc	SAS Aut	DAS PE	DAS AO	CSQ Neg	DEQ Dep	DEQ SC	BDI T2	HMI T2
SAS Soc		.055	.535**	.663**	.428**	.699**	.460**	.236**	.067
SAS Aut			.125	-.188*	.006	-.131	.297**	.139	.125
DAS PE				.647**	.531**	.402**	.695**	.501**	-.035
DAS AO					.445**	.557**	.404**	.207*	.018
CSQ Neg						.212**	.507**	.192*	-.107
DEQ Dep							.197*	.306**	-.005
DEQ SC								.475**	.009
BDI T2									.037
HMI T2									

* p<.05,

** p<.01

Note. SAS = Sociotropy Autonomy Scale, Soc = Sociotropy, Aut = Autonomy; DAS = Dysfunctional Attitudes Scale, PE = Perfectionism subscale, AO = Approval by Others subscale; CSQ Neg = Cognitive Style Questionnaire Negative Composite; DEQ = Depressive Experiences Questionnaire, Dep = Dependency, SC = Self Criticism; BDI = Beck Depression Inventory; HMI = Halberstadt Mania Inventory, T2 = Time 2.

Table 2

Descriptive Statistics of Dependent Measures

Dependent Measure	BSD/Anx		BSD		Control	F
	Mean	SD	Mean	SD	Mean	SD
SAS Soc	97.04	19.76	85.19	19.39	82.66	13.52
SAS Aut	106.98	11.90	103.32	15.33	96.92	14.46
DAS PE	3.33	1.33	2.53	0.91	2.19	0.76
DAS AO	3.95	1.19	3.49	1.00	3.48	0.79
CSQ	4.23	1.23	3.66	0.82	3.11	1.00
DEQ Dep	-0.52	0.96	-1.19	0.94	-0.89	0.78
DEQ SC	0.59	1.01	-0.41	1.09	-1.03	0.87
BDI T2	5.96	6.11	2.82	3.68	0.83	1.19
HMI T2	11.37	5.90	10.04	4.62	10.55	4.98

* p<.05,

** p<.01,

*** p<.001

Note: F-statistic denotes significant multivariate differences between all three groups. SAS = Sociotropy Autonomy Scale, Soc = Sociotropy, Aut = Autonomy; DAS = Dysfunctional Attitudes Scale, PE = Perfectionism subscale, AO = Approval by Others subscale; CSQ Neg = Cognitive Style Questionnaire Negative Composite; DEQ = Depressive Experiences Questionnaire, Dep = Dependency, SC = Self Criticism; BDI = Beck Depression Inventory; HMI = Halberstadt Mania Inventory, T2 = Time 2.

Table 3

Planned Comparisons between BSD and BSD/Anx Groups

	Groups	t	Sig. (2-tailed)	95% CI
SAS Soc	BD	-2.80	.006	-18.03, -3.07
	BD/Anx			
SAS Aut	BD	-1.96	.053	-10.68, 0.07
	BD/Anx			
DAS PE	BD	-3.77	.000	-1.18, -0.37
	BD/Anx			
CSQ Neg	BD	-1.66	.100	-0.86, 0.08
	BD/Anx			
DEQ_Dep	BD	-3.84	.000	-1.02, -0.33
	BD/Anx			
DEQ_SC	BD	-4.97	.000	-1.40, -0.60
	BD/Anx			
BDI T2	BD	-3.47	.001	-5.65, -1.53
	BD/Anx			

Note. SAS = Sociotropy Autonomy Scale, Soc = Sociotropy, Aut = Autonomy; DAS = Dysfunctional Attitudes Scale, PE = Perfectionism subscale; CSQ Neg = Cognitive Style Questionnaire Negative Composite; DEQ = Depressive Experiences Questionnaire, Dep = Dependency, SC = Self Criticism; BDI = Beck Depression Inventory; T2 = Time 2.

Table 4

Planned Comparisons between Control and BSD/Anx Groups

	Groups	t	Sig. (2-tailed)	95% CI
SAS Soc	Control	-2.83	.006	-16.10, -2.84
	BD/Anx			
SAS Aut	Control	-4.13	.000	-14.41, -5.07
	BD/Anx			
DAS PE	Control	-3.93	.000	-1.22, -0.40
	BD/Anx			
CSQ Neg	Control	-2.17	.032	-1.04, -0.05
	BD/Anx			
DEQ SC	Control	-5.73	.000	-1.58, -0.77
	BD/Anx			
DEQ Dep	Control	-1.94	.055	-0.61, 0.01
	BD/Anx			
BDI T2	Control	-5.61	.000	-7.26, -3.45
	BD/Anx			

Note. SAS = Sociotropy Autonomy Scale, Soc = Sociotropy, Aut = Autonomy; DAS = Dysfunctional Attitudes Scale, PE = Perfectionism subscale; CSQ Neg = Cognitive Style Questionnaire Negative Composite; DEQ = Depressive Experiences Questionnaire, Dep = Dependency, SC = Self Criticism; BDI = Beck Depression Inventory; T2 = Time 2.

Table 5

Bootstrapping test of mediation

T2 BDI				
Predictor	Direct Effect of X on Y	Indirect Effect of X on Y	BootLLCI	BootUCLI
Group	1.353 *	SAS Soc 0.009	-0.45	0.564
		DAS PE 1.982 *	0.490	3.968
		DEQ Dep 0.180	-0.01	0.588
		DEQ SC 0.348	-0.205	1.012

* p<.05.

Note. SAS = Sociotropy Autonomy Scale, Soc = Sociotropy, DAS = Dysfunctional Attitudes Scale, PE = Perfectionism subscale; DEQ = Depressive Experiences Questionnaire, Dep = Dependency, SC = Self Criticism.