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Family Environment and Emotion Regulation in Bipolar Disorder

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Family Environment and Emotion Regulation in Bipolar Disorder

By

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M.A., Emory University, 2009

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An abstract of
A dissertation submitted to the Faculty of the James T. Laney School of Graduate Studies of Emory University in partial fulfillment of the requirements for the degree of Doctor of Philosophy in Clinical Psychology
2013

Abstract

Family Environment and Emotion Regulation in Bipolar Disorder
By Anjana Muralidharan, M.A.

Expressed emotion (EE), or the presence of criticism, hostility, or emotional overinvolvement on the part of a caregiver, is a predictor of poorer clinical outcomes in bipolar disorder. The mechanism of this association is unclear. The present study examined two potential correlates of parental criticism in young adults with bipolar disorder: emotional reactivity to negative feedback, and cognitive schemas of self-criticism and perfectionism. Twenty young adults with bipolar disorder and 20 matched control subjects completed an interview, questionnaires, and a computer-based task with false negative feedback; mood reactivity to this feedback was assessed. For each clinical subject, at least one parental caregiver was interviewed regarding the caregiver-subject relationship. Clinical subjects exhibited a greater increase in negative affect in response to negative feedback than control subjects. Clinical subjects also exhibited higher levels of self-criticism following negative feedback than control subjects, even when controlling for mood symptoms. These findings support the Behavioral Activation System (BAS) dysregulation model of bipolar disorder. Additionally, in clinical subjects, two aspects of caregiver-subject relationships were associated with an increase in negative affect in response to negative feedback: low perceived paternal care and the presence of caregiver emotional overinvolvement. These findings support the hypothesis that disturbances in caregiver-subject relationships may be associated with later emotion dysregulation, or more specifically, a particular sensitivity to negative feedback, in bipolar patients. One important focus of family-based intervention for bipolar disorder may be building attachment, warmth, and positive communication in caregiver-patient relationships.

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Acknowledgements

The author gratefully acknowledges the contributions of several supportive individuals. First, the members of the author's dissertation committee, who provided consultation and guidance in the study design and implementation: W.E. Craighead, Ph.D., Raymond Kotwicki, M.D., Erin Tone, Ph.D., Elaine Walker, Ph.D., and Lawrence Barsalou, Ph.D. Next, a number of colleagues who made themselves available for consultation: Lorie Ritschel, Ph.D., Lisa Smith Kilpela, M.A., Daniel Yoo, M.A., and Melinda K. Higgins, Ph.D. Special thanks to James Blair, Ph.D. and Karina Blair, Ph.D., for providing the task used in the study, and to Ana Magana-Amato, Ph.D. for scoring speech samples for the study. The author is especially grateful to the many individuals who assisted with the implementation of the study, including Colleen Cowperthwait, M.A., Chris Cline, LCSW, the clinical staff at Skyland Trail, and the research staff at the Emory Child and Adolescent Mood Program. Finally, many thanks to friends and family who provided support throughout the process, beginning to end.

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Family Environment and Emotion Regulation in Bipolar Disorder

Bipolar disorder is a debilitating illness that exacts a severe toll on patients, those around them, and society. Lifetime prevalence estimates for bipolar spectrum disorders are 3.9% in adult populations (Kessler et al., 2005). There have been only a few psychosocial treatment studies regarding this population. Family-based psychosocial interventions are effective in symptom reduction and delay of relapse in bipolar adults (Miklowitz, 2006). Further research into the mechanisms by which family environment impacts the development and course of illness in bipolar disorder will likely enrich psychosocial interventions, informing the treatment of a difficult and debilitating illness.

Much of the literature examining family environment in bipolar disorder uses a construct called expressed emotion (Miklowitz, 2007). Expressed emotion (EE), or the presence of criticism and hostility or emotional overinvolvement (intrusiveness) in a caregiver or family member, predicts poorer course of illness in a number of psychiatric disorders including schizophrenia, depression, eating disorders, and bipolar disorder (Hooley, 2007). A meta-analysis of six studies that examined high EE as a predictor of relapse in remitted affective disorders found a weighted mean effect size between 0.39-0.45 (Butzlaff & Hooley, 1998). EE appears to be associated with poorer course of illness in bipolar disorder beyond its correlation with genetic loading or symptom severity (Miklowitz, 2004).

It is important to note that the relationship between high EE and patient symptoms is likely a bidirectional one. There is evidence to indicate that high EE in a relative is a product of an interaction of patient symptom severity and a stable trait in the relative. For example, rates of high EE have been found to drop as symptoms improve; at the same

time, the most critical relatives tend to stay the most critical over time (Hooley & Gotlib, 2000; Miklowitz, 2004). Thus, while EE is technically a caregiver descriptor, in the present study, it will be considered an indicator of impairment in the caregiver-patient relationship, with the important consideration that both caregiver and patient variables contribute to this measure.

The present study investigated potential correlates of a central component of EE, caregiver criticism, in a sample of bipolar young adults whose caregivers were parents or guardians. Two potential correlates of parental criticism were explored in a sample of bipolar young adults: (1) emotional reactivity to negative feedback and (2) maladaptive cognitive schemas of self-criticism and perfectionism.

Parental Criticism and Emotional Reactivity to Negative Feedback

Exposure to chronic criticism from a caregiver may affect the way bipolar young adults generally process negative feedback. According to the behavioral approach system (BAS) dysregulation model of bipolar disorder, bipolar patients may be more sensitive to criticism and failure feedback than healthy individuals. The BAS is a psychobiological system hypothesized to drive goal-directed behavior (Alloy, Abramson, Urosevic, Bender, & Wagner, 2009; Depue, Krauss, & Spoont, 1987). The BAS is responsible for activating behavior to approach appetitive stimuli and obtain rewards; weakened regulation of this system has been hypothesized to lead to increased systemic reactivity to positive and negative environmental stimuli, and eventually, increased risk for mood symptoms and episodes. Weak homeostatic regulation of the BAS confers vulnerability to greater behavioral, affective, and autonomic reactivity to rewarding or frustrating environmental stimuli.

Frustrative non-reward would be expected to impact the BAS, potentially resulting in increased arousal, anger, and/or goal-directed behavior. Several studies have examined reactivity of bipolar spectrum subjects to frustration and failure feedback. In cyclothymic subjects, a laboratory study that measured cortisol reactivity following a stressful math task found that the cyclothymic group experienced greater cortisol increases following the task and a longer return to baseline cortisol levels than controls during a 3-hour follow up (Depue, Kleiman, Davis, Hutchinson, & Krauss, 1985). Another study found that a laboratory task with failure feedback interfered with performance on a subsequent task to a greater extent with fully or partially remitted bipolar I adults than controls (Ruggero & Johnson, 2006). These results are consistent with the BAS dysregulation model of bipolar disorder.

To the extent that criticism may be interpreted as a failure cue, the BAS dysregulation model of bipolar disorder predicts that bipolar patients will exhibit increased reactivity to critical comments. To test this, one study had remitted bipolar adults and controls speak with an experimental confederate about a significant problem they were struggling with; the confederate was instructed to criticize the subjects' perspectives on the problem. The study found a trend for increased emotional reactivity to criticism in remitted bipolar adults. One correlate of this increased emotional reactivity was the perception of the criticism as more negative (Cuellar, Johnson, & Ruggero, 2009).

It is possible that exposure to chronic criticism from a caregiver may interact with a bipolar patient's reactivity to criticism. In one study, bipolar patients in high EE families tended to respond to negative comments from family members in a quick,

negative fashion; in contrast, bipolar patients in low EE families were equally likely to respond to a negative comment with a neutral or positive comment (Simoneau, Miklowitz, & Saleem, 1998). These differences were not attributable to the presence of mood symptoms. Thus, bipolar patients in high EE families may exhibit a particular sensitivity to negative feedback. The present student hypothesized that a sample of bipolar young adults would exhibit greater emotional reactivity to negative feedback than a healthy control sample, even when statistically controlling for mood symptoms. It was also hypothesized that in the current clinical sample, increased reactivity to negative feedback would be correlated with parental criticism.

Parental Criticism and Maladaptive Cognitive Schemas

In studies of healthy young adults, parental criticism/rejection has been associated with maladaptive perfectionism and high trait self-criticism (Brewin, Firth-Cozens, Furnham, & McManus, 1992; Harris & Curtin, 2002; Rice, Lopez, & Vergara, 2005). These maladaptive cognitive styles have been associated with increased risk for depressive symptoms (Alloy, Abramson, & Francis, 1999). Bipolar adults tend to exhibit cognitive styles marked by higher levels of perfectionism and self-criticism than controls, even when subjects are between episodes (Scott, Stanton, Garland, & Ferrier, 2000) or when statistically controlling for mood symptoms (Alloy, Walshaw et al., 2009). These cognitive styles predicted poorer course of illness in bipolar individuals, controlling for initial mood symptoms (Alloy, Abramson et al., 2009; Alloy, Walshaw et al., 2009). In normative populations, self-criticism and perfectionism are linked with greater reactivity to social stress (Dunkley & Blankstein, 2000; Dunkley, Zuroff, & Blankstein, 2003; Wirtz et al., 2007). Whether these cognitive styles are related to increased emotional

reactivity to negative feedback in bipolar subjects has not been explored. Additionally, empirical research has not examined whether these maladaptive cognitive styles are associated with parental criticism or hostility among bipolar patients.

Thus, a third hypothesis of the present study was that in a sample of bipolar young adults, maladaptive cognitive schema of perfectionism and self-criticism would be positively correlated with parental criticism. Additionally, it was hypothesized that, following negative feedback, the clinical sample would exhibit higher levels of self-criticism and perfectionism than a healthy control sample, even when statistically controlling for mood symptoms. Finally, in the clinical sample, it was hypothesized that: (1) self-criticism and perfectionism would be associated with increased emotional reactivity to negative feedback, and (2) self-criticism and perfectionism would partially mediate the link between parental criticism and emotional reactivity to negative feedback

Summary

Two potential correlates of parental criticism in young adults with bipolar disorder have been discussed: (1) increased emotional reactivity to negative feedback and (2) maladaptive cognitive schemas of perfectionism and self-criticism. To begin to explore the potential relationships among these variables, this pilot study enrolled 40 young adults (20 subjects with bipolar I disorder and 20 matched healthy controls) to complete interviews, questionnaires, and a computer-based lab task with negative feedback. It was predicted that, following negative feedback, bipolar subjects would exhibit increased emotional reactivity, and increased maladaptive cognitive schema of perfectionism and self-criticism, compared to controls.

For bipolar subjects, a brief interview was administered to at least one parental caregiver to measure parental criticism and to ascertain the quality of the caregiver-subject relationship. The relationships among parental criticism and a number of subject variables (perfectionism, self-criticism, and emotional reactivity to negative feedback) were examined cross-sectionally in clinical subjects. It was predicted that parental criticism would be positively correlated with (1) a greater increase in negative mood in response to negative feedback and (2) maladaptive cognitive schemas of self-criticism and perfectionism. Notably, these hypotheses did not make predictions about directionality or causality among these variables. Preliminarily, to make an exploratory prediction about directionality, to be further tested in future studies with longitudinal designs, it was hypothesized that self-criticism and perfectionism would partially mediate the relationship between parental criticism and increase in negative mood in response to negative feedback (see Appendix A for a pictorial representation of this model).

Method

Participants

Young adult subjects with bipolar I disorder were recruited from a residential treatment facility in Atlanta GA, and control subjects were recruited from the Emory University, Georgia State University, and the greater Atlanta communities.

Bipolar subjects had been stabilized on a pharmacotherapy regimen of a mood stabilizer and/or an atypical antipsychotic for at least seven days. Only subjects with at least one parental caregiver involved in their treatment were recruited for the study. Parental caregivers were defined as parents or guardians who lived with the subject in a parental role for at least five years, and who were currently involved in the subject's

treatment (e.g., attendance of family sessions at the residential facility). Bipolar participants were excluded based on the presence of a current episode of mania or hypomania, psychotic symptoms, imminent suicidality, current substance or alcohol dependence, comorbid post-traumatic stress disorder, borderline personality disorder, or a history of parental physical abuse or neglect.

Control participants were matched for gender and race with bipolar patients. Controls could not meet criteria for any past or present DSM-IV Axis I disorder or borderline personality disorder. Additionally, they could not exhibit current symptoms of mania or depression nor could they currently be taking any psychotropic medications. Potential control subjects with a history of parental physical abuse or neglect were also excluded from the study.

Approval for the study was obtained from the Emory University Institutional Review Board.

Measures

Structured Clinical Interview for DSM-IV Axis I Disorders (SCID). The SCID (First, Spitzer, Gibbon, & Williams, 2001) is a widely used semi-structured interview which provides current and lifetime diagnoses of DSM-IV Axis I disorders. The SCID has demonstrated adequate to good inter-rater reliability; Cohen's kappa values for Axis I diagnoses ranged from 0.61 to 0.83 in a recent study (Lobbestael, Leurgans, & Arntz, 2011). The SCID was used to determine eligibility for all subjects in the present study.

Borderline Personality Disorder Module of the Structured Clinical Interview for DSM-IV Axis II Disorders (SCID-II). The SCID-II is a semi-structured interview

that provides current diagnoses of DSM-IV personality disorders (First, Gibbon, Spitzer, Williams, & Benjamin, 1997). The Borderline Personality Disorder Module of the SCID-II was administered to determine subject eligibility. This module has demonstrated excellent inter-rater reliability (Cohen's kappa = 0.91; Lobbestael et al., 2011). Participants who met criteria for borderline personality disorder were excluded from the study.

Young Mania Rating Scale (YMRS). The YMRS is an 11-item clinician-administered interview that allows the quantification of the severity of manic symptoms experienced by a subject over the past week. The YMRS was used to ascertain the presence and severity of mania symptoms in all subjects. Potential control subjects with a YMRS score of greater than 7 were excluded from the study (typical criterion for absence of mania; Tohen et al., 2009). The YMRS has strong inter-rater reliability (Spearman correlation for total score = 0.93) and concurrent validity (Spearman correlation with global rating of mania = 0.88; Young, Biggs, Ziegler, & Meyer, 1978).

Hamilton Depression Rating Scale (HDRS). The HDRS is a 17-item clinician-administered interview measure that quantifies the severity of depression symptoms experienced by a subject over the past week. The HDRS was used to ascertain the presence and severity of depression symptoms in all subjects. Potential control subjects with a HDRS score of 8 or greater (typical criterion for absence of major depression; Gaynes et al., 2005) were excluded from the study. The HDRS has good internal consistency (Cronbach's alpha = 0.789), good inter-rater reliability (intraclass $r = 0.937$), and adequate to good test-retest reliability (Pearson r correlations ranging from 0.65-0.98; see meta-analysis by Trajković et al., 2011 for review).

Psychosocial Schedule for Young Adult Children (Psychosocial Schedule – YA). The Psychosocial Schedule – YA is an adapted version of the Psychosocial Schedule for School-Age Children, a semi-structured interview for children and parents that assesses child social functioning. For the purposes of the present study, the sections of the Schedule that assess the parent-child relationship were adapted for a young adult population, and these sections were administered to both young adult subjects and, for clinical subjects, their parental caregivers. This was an exploratory use of this interview. The original version of the Psychosocial Schedule for School-Age Children has adequate test-retest reliability (intraclass $r = 0.67$) and good inter-rater reliability (intraclass $r = 0.93$; Lukens et al., 1983).

Positive and Negative Affect Schedule (PANAS). The PANAS is a 20-item self-report measure of positive and negative affect experienced within a specified time frame. In the present study, subjects were asked to rate their *current* affective state at two time points during the study appointment. The PANAS has strong internal consistency (Cronbach's alpha = 0.85 for Negative Affect and 0.89 for Positive Affect), and the subscales are significantly correlated with measures of anxiety and depression in theoretically expected ways (Crawford & Henry, 2004).

Dysfunctional Attitude Scale – Form A (DAS). The DAS is a 40-item self-report measure designed to assess cognitive distortions (Weissman & Beck, 1978). The measure provides scores on three subscales; the present study only used the Perfectionism subscale. Higher scores represent greater presence of dysfunctional beliefs. The DAS has demonstrated strong test-retest reliability (e.g., $r = 0.84$ over an 8-week interval;

Dobson & Breiter, 1983). Additionally, the Perfectionism subscale has demonstrated excellent internal consistency (Cronbach's alpha = .91; Imber et al., 1990).

Depressive Experiences Questionnaire (DEQ). The DEQ is a 66-item self-report questionnaire measuring aspects of depressive personality styles (Blatt, D'Afflitti, & Quinlan, 1976). The measure provides scores on three subscales; the present study only used the Self-Criticism subscale. The DEQ-Self-Criticism scale has good test-retest reliability (r = 0.75; Zuroff, Moskowitz, Wielgus, Powers, & Franko, 1983). The subscale also has demonstrated good internal consistency (Cronbach's alpha = 0.75-0.77), and is highly correlated with other measures of depression in clinical populations (Zuroff, Quinlan, & Blatt, 1990).

Perceived Criticism (PC). The PC measure is a simple 2-item self-report measure that asks subjects to rate each of the two items on a 10-point Likert scale: (1) how critical they feel a particular relative is of them, and (2) how upset they get when this relative criticizes them. This simple measure has demonstrated test-retest reliability (r = 0.75 between initial assessment and 3-month follow-up) and concurrent validity, including correlation with relative EE scores (r = 0.51; Hooley & Parker, 2006). In a study of bipolar adults, high scores on the second item predicted higher severity of symptoms at 1-year follow-up (Miklowitz, Wisniewski, Miyahara, Otto, & Sachs, 2005).

Parental Bonding Instrument (PBI). The PBI is a 25-item self-report questionnaire that retrospectively assesses parental care and psychological control. The PBI has adequate evidence of concurrent, construct, and predictive validity, and adequate test-retest reliability (0.76 for the parental care and 0.63 for the control scale; Parker, Tupling, & Brown, 1979).

Five-Minute Speech Sample (FMSS). The FMSS is an interview measure administered to relatives of a patient. It requires each relative to speak for five uninterrupted minutes about the subject and his/her relationship with the subject. The speech sample is recorded and later coded for: (1) number of critical comments, (2) presence or absence of dissatisfaction, (3) overall warmth, and (4) emotional overinvolvement (EOI). EOI includes excessive emotional display, distress/concern, self-sacrifice, praise, affection, or detail about the subject's past. The FMSS allows the researcher to classify the relative as high, low, or "borderline" on EE. The FMSS has moderate to good concurrent validity; overall agreement with the gold standard measure of EE, the Camberwell Family Interview, ranged from 73.0% to 75.0%. In mood disorders, a rating of high EE on the FMSS has been predictive of poorer clinical outcomes (Hooley & Parker, 2006).

Procedures

Recruitment. Clinical subjects were recruited from a residential facility in Atlanta, Georgia by the primary investigator and a co-investigator, who were two advanced-level clinical psychology graduate students. The investigators examined the electronic medical record for each patient with a bipolar I or II disorder diagnosis to ascertain whether the patient met any of the following *exclusion* criteria: (1) history of parental abuse or neglect, (2) comorbid post-traumatic stress disorder, (3) comorbid substance or alcohol dependence, (4) lack of involvement by a parental caregiver in treatment. Subjects who did not meet exclusion criteria were placed on a list of *potential qualifiers* for the study.

The investigators tracked the progress of treatment of potential qualifiers through the electronic medical record. Potential qualifiers met criteria for a study appointment when: (1) they did not exhibit psychotic symptoms, (2) they did not meet criteria for a manic episode, (3) they were not imminently suicidal, and (4) they were stable on the same dose of a mood stabilizer and/or an atypical antipsychotic for at least 7 days. Once a potential qualifier met this criteria, one of the investigators established a study appointment with the patient.

Control subjects were recruited by advertisement within the Emory University, Georgia State University, and greater Atlanta communities. Control subjects were matched on gender and race, and efforts were made to ensure that bipolar and control groups were similar on age and years of education. Control subjects were scheduled for a study appointment after a phone screen determined whether they met basic inclusion criteria and did not meet basic exclusion criteria for the study.

Study Appointment. All subjects completed a one-time 2-4 hour study appointment with one of the investigators. The researcher obtained informed consent at the beginning of the session. Permission to video record all interviews was also obtained.

Diagnostic interview. The SCID, SCID II Borderline Personality Disorder section, YMRS, and HDRS were administered to the subject by one of the investigators. Based on the outcome of these interviews, the subject's final eligibility for the study was determined. If the subject qualified for the study, the data collection took place on the same day as the diagnostic interview.

Assessment of the caregiver-subject relationship. Once study eligibility was determined, subjects were interviewed about warmth and tension/hostility in their relationships with their parental caregivers using the Psychosocial Schedue – YA.

Computer task and pre/post mood assessment. Next, subjects completed the PANAS to assess current affective state. Subjects then completed a computer-based Affective Stroop task, lasting approximately 15 minutes (see Blair et al., 2007 for description). Following completion of the task, the following text appeared on the screen, regardless of the subject's performance on the task: "You have now completed the task. Percentile rank: 17%. Overall performance: Poor. Your performance places you in the bottom 17% of all participants who have completed this task. That is, out of 100 participants, 83 participants performed better than you." Following completion of the task, subjects completed the PANAS again to assess affective state. Subjects were then debriefed about the study, and were asked, "When you received that negative feedback earlier, how upset were you on a scale of 1-10?"

Subject questionnaires. Finally, subjects completed the following self-report questionnaires: the DAS and the DEQ to assess cognitive schema, and the PBI and the PC scale to assess quality of relationships with parental caregivers.

Caregiver Interview. For the clinical sample only, once the study appointment was complete, the parental caregiver(s) currently involved in the patient's treatment was (were) scheduled for 30-minute in-person interviews. A member of the research team completed an informed consent with each caregiver at the beginning of the interview. All interviews were recorded with permission from the caregivers. The FMSS was administered to assess presence of parental criticism and hostility. Caregivers were

interviewed about warmth and tension/hostility in their relationships with clinical subjects using the Psychosocial Schedule – YA. Summary ratings were obtained by combining caregiver responses with patient responses.

Scoring of FMSS. FMSS's were recorded as digital audio files and saved in a secure encrypted file container on an online server. Upon completion of data collection, the measure's creator[1], who was uninformed as to subject identities and study hypotheses, obtained the files from this online server and coded the samples.

Results

Participants

Twenty clinical participants completed the study (10 males, 10 females; 18 Caucasians, 2 African-Americans; mean age= 26.20 years). Twenty control participants matched on race and gender also completed the study (mean age= 24.78 years). Ninety-five percent of both groups entered college (19 out of 20 subjects); 5 subjects in the clinical group were current college students, while 4 subjects in the control group were current college students. In the clinical group, 8 subjects had dropped out of college due to mental health difficulties; the control group contained no college dropouts. T-tests comparing males and females within and between groups, and t-tests comparing clinical and control subjects, found no significant differences in age.

Clinical participants represented a severe sample of young adults with bipolar I disorder in the early stages of mood stabilization and recovery (see Table 1). Fifteen subjects had a history of psychotic features, 7 had at least one comorbid anxiety disorder, and 7 had a history of substance dependence.

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[1] The author gratefully acknowledges the contribution of Ana Magana-Amato, Ph.D., who scored the samples for this study.

Mood Symptoms

One-way ANOVA's compared HDRS and YMRS scores between clinical and control subjects. Clinical subjects had higher levels of depression (F (1,38) = 17.230, p = 0.0002, η^2 = 0.312) and mania (F (1,38) = 9.504, p = 0.004, η^2 = 0.200). Within clinical subjects, no significant gender differences were found on HDRS or YMRS scores.

HDRS and YMRS scores were related to a number of subject variables (see Table 2). When conducting analyses with variables that were significantly associated with HDRS or YMRS scores, these scores were entered as covariates to clarify the impact of mood symptoms.

Affect and Mood Reactivity

Clinical and control subjects were compared on the PANAS before the task using one-way ANOVA (see Table 3). NA-Pre was significantly higher in clinical subjects (F(1,38) = 12.196, p = 0.001, η^2 = 0.243); this difference was no longer significant when HDRS score was entered as a covariate (F(1,37) = 0.656, p = 0.423, η^2 = 0.017). Baseline PANAS Positive Affect (PA-Pre) was not significantly different between groups (F(1,38) = 0.035, p = 0.853, η^2 = 0.001).

Paired-sample T-tests comparing Pre- and Post- PANAS scores revealed no significant differences in NA for either clinical subjects (t(19) = -0.330, p = 0.745, Cohen's d = 0.07) or controls (t(19) = -1.196, p = 0.246, Cohen's d = 0.27). PA decreased significantly in both clinical subjects and controls (t(19) = 3.167, p = 0.005, Cohen's d = 0.71 and t(19) = 3.428, p = 0.003, Cohen's d = 0.77, respectively).

Clinical and control subjects were compared on the PANAS after the task using one-way ANOVA (see Table 3). NA after the task (NA-Post) was significantly higher in

clinical subjects than controls ($F(1,38) = 17.798$, $p = 0.0001$, $\eta^2 = 0.319$). PA after the task (PA-Post) was not significantly different between groups ($F(1,38) = 1.730$, $p = 0.196$, $\eta^2 = 0.044$).

ANCOVA was used to examine differences in pre-post change in NA between groups (see Senn, 2006 for further explanation of this use of ANCOVA). The difference in NA-Post between groups remained significant when NA-Pre was entered as a covariate ($F(1,37) = 5.329$, $p = 0.027$, $\eta^2 = 0.126$; see Table 4), indicating a greater increase in NA after the task in the clinical group.

In the entire sample, PA-Pre was regressed on PA-Post, and NA-Pre was regressed on NA-Post. The residuals from these regression analyses were used as change scores (PA-Res and NA-Res respectively). These residual change scores were correlated with a number of subject and caregiver-subject relationship variables in the clinical sample to examine correlates of mood reactivity (see Table 5).

Self-Critical and Perfectionistic Schema

Clinical and control subjects were compared on the Dysfunctional Attitudes Scale –Perfectionism subscale (DAS-P) and the Depressive Experiences Questionnaire – Self-Criticism subscale (DEQ-SC) using one-way ANOVA (see Table 3). Comparing clinical and control subjects on DAS-P found no differences ($F(1,38) = 0.705$, $p = 0.406$, $\eta^2 = 0.018$).

Comparing clinical and control subjects on DEQ-SC found significantly higher levels in the clinical sample ($F(1,38) = 15.573$, $p = 0.0003$, $\eta^2 = 0.291$). DEQ-Self Criticism was correlated with Negative Affect at baseline (NA-Pre; $r(38) = 0.561$, $p = 0.0002$) and HDRS score ($r(38) = 0.482$, $p = 0.002$); when these were entered as

covariates, clinical subjects still had higher levels of DEQ-SC than controls ($F(1,36) = 5.035$, $p = 0.031$, $\eta^2 = 0.123$).

Within clinical subjects, no significant gender differences were found on the DAS-P or the DEQ-SC scales.

Caregiver Relationships

One-way ANOVAs were conducted comparing clinical and control subjects on the Perceived Criticism (PC) scale, the Parental Bonding Index (PBI), and the Psychosocial Schedule for Young Adult Children (Psychosocial Schedule – YA; see Table 3). No significant differences were found on the PC or PBI scales.

As measured by the Psychosocial Schedule – YA, clinical subjects communicated more frequently ($F(1,38) = 4.252$, $p = 0.046$, $\eta^2 = 0.101$) with maternal caregivers than control subjects; this difference disappeared when YMRS score was entered as a covariate ($F(1,37) = 1.419$, $p = 0.241$, $\eta^2 = 0.037$). Clinical subjects also engaged in more activities with their maternal caregivers ($F(1,38) = 7.207$, $p = 0.011$, $\eta^2 = 0.159$) than control subjects; this difference reduced to a trend when YMRS score was entered as a covariate ($F(1,37) = 3.073$, $p = 0.088$, $\eta^2 = 0.077$). Additionally, clinical subjects had higher levels of hostile communication with maternal caregivers ($F(1,38) = 13.445$, $p = 0.001$, $\eta^2 = 0.261$); this difference remained significant when YMRS score was entered as a covariate ($F(1,37) = 7.473$, $p = 0.010$, $\eta^2 = 0.168$). There were no significant differences in levels of overall warmth in the maternal relationship between the two groups. Maternal relationships were marked by higher levels of overall tension and hostility in clinical subjects than controls ($F(1,38) = 5.540$, $p = 0.024$, $\eta^2 = 0.127$).

As measured by the Psychosocial Schedule – YA, clinical subjects had higher levels of hostile communication ($F(1,36) = 23.694$, $p = 0.00002$, $\eta^2 = 0.397$) and higher levels of overall tension ($F(1,36) = 14.802$, $p = 0.0005$, $\eta^2 = 0.291$) in relationships with paternal caregivers; these differences remained significant when YMRS and HDRS scores were entered as covariates ($F(1,34) = 11.914$, $p = 0.002$, $\eta^2 = 0.259$ for hostile communication, $F(1,34) = 5.154$, $p = 0.030$, $\eta^2 = 0.132$ for overall tension). Clinical subjects had lower levels of warmth ($F(1,36) = 11.604$, $p = 0.002$, $\eta^2 = 0.244$) with paternal caregivers than controls; this difference reduced to a nonsignificant trend when HDRS and YMRS scores were entered as covariates ($F(1,34) = 3.385$, $p = 0.075$, $\eta^2 = 0.091$).

Within clinical subjects, no significant gender differences were found on the PBI, the PC scale, or the Psychosocial Schedule – YA.

Caregiver Relationships in Clinical Subjects

Five Minute Speech Samples (FMSS) were collected from 30 caregivers of bipolar patients (18 maternal caregivers, 12 paternal caregivers). For 10 subjects, samples were collected from both the maternal and paternal caregiver; for the other 10, samples were collected from only one caregiver. FMSS Parental Criticism, as measured by the number of critical comments made in each sample, was not used for further analyses, as all but four of the speech samples contained no critical comments. FMSS's were rated for overall warmth (FMSS Maternal/Paternal Warmth), and scored on number of positive remarks (FMSS Maternal/Paternal Positive Remarks). Male and female clinical subjects' caregivers did not significantly differ on these measures.

Paired-samples t-tests were used to compare maternal and paternal caregivers on the PBI, PC, the Psychosocial Schedule – YA, and the FMSS. On the PBI, clinical subjects perceived their maternal caregivers as more caring than their paternal caregivers ($t(19) = 3.837$, $p = 0.001$, Cohen's $d = 0.86$). There were no significant differences between maternal and paternal caregivers on the Psychosocial Schedule – YA or the PC scale. On the FMSS, maternal caregivers made more positive remarks than paternal caregivers ($t(9) = -2.899$, $p = 0.018$, Cohen's $d = 0.92$). There were no significant differences between FMSS Maternal Warmth and FMSS Paternal Warmth.

Paternal PBI-Care was significant correlated with a number of items on the Psychosocial Schedule-YA, including levels of hostile communication ($r(17) = -0.586$, $p = 0.008$), levels of overall tension ($r(17) = -0.535$, $p = 0.018$), and levels of overall warmth ($r(17) = 0.473$, $p = 0.041$), in relationships with paternal caregivers.

Schema, Mood Reactivity, and Caregiver Relationships in Clinical Subjects

Exploratory analyses examined correlations among caregiver relationship variables and subject variables in the clinical sample (see Table 5). HDRS scores were significantly correlated with NA-Pre ($r(18) = 0.676$, $p = 0.001$) and inversely correlated with PA-Pre ($r(18) = -0.576$, $p = 0.008$). HDRS and YMRS scores were not significantly related to any other caregiver variables, subject variables, or to NA or PA residual change scores.

DAS-Perfectionism and DEQ-Self-Criticism were significantly correlated with each other ($r(18) = 0.818$, $p = 0.00001$). DAS-Perfectionism was significantly correlated with NA-Pre ($r(18) = 0.452$, $p = 0.045$). DAS-Perfectionism was correlated with the

paternal PC scale ($r(17) = 0.600$, $p = 0.007$). Cognitive schemas were not related to any other caregiver variables or to NA or PA residual change scores.

FMSS's were rated for overall warmth. FMSS Paternal Warmth was significantly correlated with two other measures of paternal warmth: Paternal PBI-Care ($r(8) = 0.811$, $p = 0.001$) and overall paternal warmth as measured by the Psychosocial Schedule – YA (not shown in table; $r(8) = 0.693$, $p = 0.012$). FMSS Paternal Warmth was not related to PA or NA residual change scores (PA-Res or NA-Res). However, Paternal PBI-Care was significantly correlated with PA-Res ($r(18) = 0.578$, $p = 0.008$), and inversely correlated with NA-Res ($r(18) = -0.453$, $p = 0.045$).

To examine the impact of parental EE on clinical subjects, further exploratory analyses were conducted. Each sample was given one of 6 expressed emotion (EE) labels (see Magana et al., 1985 for description of each label): (1) critical, (2) emotionally overinvolved (EOI), (3) borderline EOI, (4) borderline critical, (5) borderline critical/EOI, and (6) low. Figure 1 displays the number of samples that received each label. Samples labeled as critical or EOI were considered high EE, while samples in the other four categories were labeled as low EE. One-way ANOVAs compared clinical subjects in the following groups: high EE versus low EE (1, 2 versus 3, 4, 5, 6), critical/borderline critical versus non-critical (1, 4, 5 versus 2, 3, 6), and EOI/borderline EOI versus non-EOI (2, 3, 5 versus 1, 4, 6). These groups were compared on the following variables: age of onset of manic symptoms, age of onset of depression symptoms, YMRS scores, HDRS scores, BDI scores, DEQ Self-Criticism, DAS Perfectionism, PANAS Positive and Negative Affect at baseline, and PANAS residual change scores.

In the second comparison (critical/borderline critical versus non-critical), the critical/borderline critical group had a earlier age of onset of manic symptoms ($F(1,18) = 6.945$, $p = 0.017$, $\eta^2 = 0.278$). In the third comparison (EOI/borderline EOI versus non-EOI), the EOI/borderline EOI group exhibited higher NA-Res ($F(1,18) = 5.559$, $p = 0.030$, $\eta^2 = 0.236$).

Given that Paternal PBI-Care and the presence of EOI/borderline EOI were both associated with higher NA-Res, these correlates were entered into a multiple regression model. Paternal PBI-Care and the presence of EOI/borderline EOI significantly contributed to variance in NA-Res in the clinical sample ($F(2,17) = 4.629$, $p = 0.025$, $R^2 = 0.353$; see Table 6).

Discussion

The present study aimed to examine two potential correlates of parental criticism in young adults with bipolar disorder: emotional reactivity to negative feedback, and cognitive schemas of self-criticism and perfectionism. As hypothesized, clinical subjects exhibited a greater increase in negative affect in response to negative feedback than controls; this increase was not related to mood symptoms or baseline negative affect. Additionally, as hypothesized, clinical subjects exhibited higher levels of self-criticism following negative feedback than control subjects, even when controlling for mood symptoms and baseline negative affect. These findings support the Behavioral Activation System (BAS) dysregulation model of bipolar disorder. Additionally, in clinical subjects, two aspects of caregiver-subject relationships were associated with an increase in negative affect in response to negative feedback: low perceived paternal care and the presence of caregiver emotional overinvolvement. These findings support the hypothesis

that disturbances in caregiver-subject relationships may be associated with emotion dysregulation, or more specifically, a particular sensitivity to negative feedback, in bipolar patients. Notably, the direction of these associations could not be tested in the present study. It is likely that caregiver-subject relationship variables and subject emotional reactivity influence each other in a bidirectional manner (i.e., the bipolar patient's emotional reactivity may negatively impact the caregiver-patient relationship; simultaneously, negativity in the caregiver-patient relationship may contribute to the bipolar patient's sensitivity to negative feedback). Future studies with longitudinal designs are necessary to tease apart more adequately the direction of the relationships among these variables.

Self-Critical and Perfectionistic Schema

Bipolar young adults in the present study exhibited higher levels of self-criticism than controls, even when controlling for mood symptoms and baseline negative affect. This replicates findings from a previous study (Alloy, Walshaw et al., 2009). Contrary to the study hypothesis, clinical and control subjects did not differ on levels of perfectionism. Levels of perfectionism in the clinical sample were similar to those found in previous studies of bipolar adults, while the control subjects in the present study appeared to be higher on perfectionism than found in previous control samples (Alloy, Walshaw et al., 2009; Scott et al., 2000). This may be because 8 of the control subjects were present and former students of a competitive university in the Atlanta area, a context that may select for perfectionistic attitudes. Compared to control samples in previous studies, bipolar subjects exhibited elevated levels of perfectionism. Consistent with the hypothesis that individuals with bipolar disorder exhibit elevated BAS-relevant

cognitive schema regardless of the presence of mood symptoms, self-criticism and perfectionism were not significantly associated with mood symptoms within the clinical sample.

Affect and Mood Reactivity

Clinical subjects exhibited a greater increase in negative affect following negative feedback than control subjects; this was not related to mood symptoms or negative affect at baseline. This finding corroborates previous studies that found increased reactivity to negative feedback in inter-episode bipolar adults (Cuellar et al., 2009; Ruggero & Johnson, 2006), providing further support for the BAS dysregulation model of bipolar disorder.

It is possible that the increase in negative affect exhibited by clinical subjects was due to the stress of task completion or to exposure to affective stimuli during the task, and not specifically to the negative feedback. To test this, after subjects completed the mood questionnaires, they were asked to rate, on a scale from 1 to 10, how distressed they felt when they received the negative feedback. These subjective ratings were highly correlated with increases in negative affect following the task, and inversely correlated with decreases in positive affect following the task. To more clearly tease apart the effects of task completion versus negative feedback, a future study with multiple task conditions (positive feedback, neutral feedback, negative feedback) will be important.

Contrary to study hypotheses, levels of self-criticism were not related to the greater increase in negative affect in bipolar subjects. Thus, self-critical thoughts may not be associated with this increase. An alternative explanation is that subjects perceived the negative feedback as a threat to self-concept. That is, instead of triggering self-

critical thoughts and feelings of worthlessness, the negative feedback triggered worry thoughts about subject progress, functioning, and self-worth, leading to feelings of anxiety. The high level of self-criticism found in the bipolar sample is likely reflective of poor self-esteem and negative view of self; negative feedback would be expected to trigger higher levels of anxiety in such a sample. Thus the greater increase in negative affect in the bipolar sample in this study may be reflective of an increase in anxiety. Future studies could include a separate measure of anxiety to examine whether negative feedback is particularly linked with this emotional response in a bipolar sample.

Caregiver Relationships

Compared to control subjects, clinical subjects communicated more and spent more time with maternal caregivers; this difference was attributable to manic symptoms. They also exhibited higher levels of hostile communication and higher levels of overall tension in relationships with maternal caregivers; these differences were partially attributable to manic symptoms. Maternal caregivers were likely engaging in more active monitoring of clinical subjects who were more symptomatic, and this increased contact was at times hostile or tense in nature. Clinical subjects also had lower levels of warmth in their relationships with paternal caregivers; this difference was partially attributable to symptoms of mania and depression. These findings corroborate previous findings that symptoms contribute to, but do not completely account for, impairment in family relationships for individuals with bipolar disorder (Miklowitz, 2004; Rosenfarb et al., 2001).

Clinical subjects also had higher levels of hostile communication and overall levels of tension and hostility in their paternal relationships than control subjects. These

differences were *not* attributable to mood symptoms, and notably, were inversely related to perceived paternal care. Thus, in a subset of bipolar subjects, paternal relationships were marked by tension and hostility that was not accounted for by mood symptoms. This tension and hostility was related to subjects perceiving their paternal caregivers as uncaring.

Effects of Parental Criticism

In the present study, one original aim was to examine the impact of parental criticism, as measured by the Five Minute Speech Sample (FMSS), on mood reactivity and self-critical and perfectionistic schema. There was not enough variability in the parental criticism measure to achieve these aims. Alternatively, to examine the impact of parental criticism on mood reactivity, subjects whose caregivers were rated as "borderline critical" or higher were compared to subjects whose caregivers did not meet this criteria. (To reach a threshold of "borderline critical", caregivers had to make at least one dissatisfied statement about the subject). Grouping subjects in this manner was consistent with findings that the concurrent and predictive validity of the FMSS increases when "borderline" relatives are rated as high EE (Hooley & Parker, 2006; Yan, Hammen, Cohen, Daley, & Henry, 2004). No group differences were found on mood reactivity, self-criticism, or perfectionism; thus, although the presence of "borderline criticism" in caregivers was predictive of depressive symptoms in a previous study of bipolar adults (Yan et al., 2004), it was not associated with maladaptive cognitive schema or increased mood reactivity in response to negative feedback in the present study.

It is possible that even using a liberal definition, the FMSS underestimated levels of parental criticism. Given that the study took place in a residential treatment facility,

caregivers may have been particularly concerned with impression management when interacting with the research investigators, thereby decreasing the level of negativity in their descriptions of subjects. Additionally, caregivers were engaged with subjects in an active treatment process with a supportive treatment team, and, therefore, may have been more likely to express a positive and hopeful outlook for the subject. Finally, the caregiver(s) that the subjects consented for the research staff to contact were more likely to be caregivers with whom the subjects had a positive relationship. Thus, this selection bias might have led to an underestimation of criticism and hostility in the subjects' relationships with caregivers.

Correlates of Mood Reactivity in Clinical Subjects

Following negative feedback, clinical subjects exhibited a greater increase in negative affect than control subjects. Although clinical subjects as a group exhibited greater mood reactivity to negative feedback than controls, there was a good deal of variability within the clinical sample. This corroborated findings from a previous study of criticism delivered to a group of euthymic bipolar adults, in which only a subset of bipolar subjects exhibited increased mood reactivity to negative feedback (Cuellar et al., 2009).

Exploratory analyses revealed that perceived paternal care was correlated with a decrease in positive affect, and inversely related to an increase in negative affect, following negative feedback. In turn, perceived paternal care was related to a lack of paternal warmth towards the subject as measured by the FMSS. Thus, some bipolar subjects may have perceived a lack of warmth, or a neutral attitude on the part of the paternal caregiver, as a lack of caring. Bipolar subjects who were more likely to perceive

a lack of warmth from fathers as a lack of care were also more likely to react negatively to negative feedback. It is possible that this reflects a tendency to perceive neutral/negative stimuli in the environment as particularly negative. This interpretation is consistent with the Cuellar, Johnson, and Ruggero (2009) study, in which one correlate of increased negative affect in response to criticism was a tendency to perceive the criticism as more critical. It is also consistent with the BAS dysregulation model, and supports the idea that a particular sensitivity to negative feedback may be operating across different types of stimuli in some bipolar subjects.

Another interpretation of the relationship between paternal care and change in affect for clinical subjects is that negative feedback "activated" perceptions of low paternal care in a subset of bipolar subjects. This interpretation is consistent with an alternative explanation for the findings in the present study: low paternal warmth/perceived care may be indicative of disturbances in parent-subject attachment. Disturbances in parental attachment are linked to attachment anxiety or avoidance in adulthood. In turn, insecure attachment styles in adulthood have been linked to increased perceived stress, increased physiological responding to stress, and failure to appropriately engage social support in times of stress (Maunder & Hunter, 2001). Thus, in the subset of bipolar subjects with poor paternal attachment, the negative feedback in the study may have triggered an increased stress response, coupled with memories of past failures to obtain support and comfort from paternal caregivers in times of need. Future studies of the link between parent-subject relationship variables and emotional reactivity to negative feedback in bipolar subjects could investigate the role of attachment security in mediating this relationship.

It is notable that perceived care from *paternal* caregivers, in particular, was related to mood reactivity to negative feedback. Interestingly, even though levels of maternal and paternal warmth as measured by the FMSS did not differ, clinical subjects perceived paternal caregivers as less caring than maternal caregivers based on subject self-report. It is difficult to explain these differences based on the data in the current study. Notably, a number of families in the present study preserved traditional gender roles; i.e., the paternal caregiver served as primary breadwinner while the maternal caregiver served a more nurturing, caretaking role in the family. Additionally, a number of paternal caregivers in the study were highly successful, powerful men in their respective professional careers. Thus, it is possible that bipolar subjects in the present study felt particular pressure to live up to the example and/or obtain the approval of their high-achieving paternal caregivers. It is also possible that the paternal focus on career and work could have contributed to the development of an insecure attachment in the paternal-subject relationship. These explanations are speculative however, and direct empirical investigation is required to confirm them.

The presence of emotional overinvolvement (EOI) or "borderline" EOI in a caregiver was also associated with increased negative affect in response to negative feedback. Caregivers were rated as EOI/borderline EOI when they expressed excessive affection, praise, distress, or self-sacrifice regarding the subject, or excessive detail about the subject's past. It is unclear how to interpret this finding, mainly because it is unclear how EOI relates to the EE construct as a whole. Early research with EE determined that criticism was the main driver in the link between EE and relapse, particularly for mood disorders (Hooley, 2007). According to one factor analysis, EOI is a varied construct that

is distinct from other aspects of EE (Chambless, Steketee, Bryan, Aiken, & Hooley, 1999). In studies of bipolar adults, however, the relative effects of EOI versus criticism/hostility have rarely been reported. In one study of bipolar adults where this distinction was made, it was criticism, and not EOI, that predicted poorer course of illness (Yan et al., 2004). In another study of bipolar adults, caregiver EOI was associated with poorer medication adherence at seven-month follow-up (Perlick et al., 2004). Thus, it is unclear what role EOI plays in course of illness in bipolar subjects.

EOI may reflect caregiver feelings of guilt and responsibility (Chambless et al., 1999) and has been associated with higher perceived caregiver burden (Perlick et al., 2004); if this were the case in the present study, subjects with EOI caregivers may have felt particular pressure to alleviate caregiver distress by achieving full mood stability and recovery of mental health. In turn, this internal pressure to recover may have been associated with a particular sensitivity to any negative feedback that signaled a lack of progress. Alternatively, EOI has also been associated with the use of ineffective ways of coping with stress, such as avoidance or emotion-focused coping (Scazufca & Kuipers, 1999). Therefore, EOI caregivers may tend to be more emotionally dysregulated themselves, serving as poor role models for the patient, and as generally destabilizing agents in their family systems. In turn, this could negatively impact the development of the patient's ability to cope effectively with environmental stressors. Both of these potential explanations are highly speculative. The EOI construct as it relates to the families of bipolar subjects requires further investigation.

In sum, in a sample of bipolar young adults, perceived care from a paternal caregiver, and EOI/borderline EOI from either parental caregiver, are each related to

increased negative affect following negative feedback. These parent-subject relationship variables were not related to each other in the present study, and appear to represent two different pathways by which disturbances in parental relationships can lead to emotion dysregulation in individuals with bipolar disorder.

Limitations

There are a number of important limitations of the present study. The small sample size, along with the cross-sectional design, make it difficult to draw conclusions about causal relationships among the outcome variables. Within the clinical sample, bipolar subjects were enrolled in the study in differing mood states, on a variety of medications, and with multiple comorbidities. The sample size did not allow for examination of the separate effects of these different variables. Additionally, while the clinical sample represents a severe "real world" bipolar population, the sample was limited to subjects of a relatively high socioeconomic status who could afford treatment at a state-of-the-art residential facility. The ethnic make-up of the clinical sample reflected the population at the residential facility (majority Caucasian), and the findings may not be generalizable to other ethnic or socioeconomic groups.

Another limitation of the present study was that cognitive schema were not measured prior to the delivery of negative feedback. A baseline measure of cognitive schema would have allowed for a more accurate estimation of the effects of negative feedback on report of self-criticism. The study would also have been strengthened by a systematic measure of the perceived legitimacy of the false negative feedback. Although observational evidence supported the perceived validity of this feedback, it may be possible that a subset of subjects questioned its legitimacy; this is a potential confound.

As aforementioned, the emotional reactivity measured in this study may have been due to the tedium of task completion or to the affective stimuli presented in the task, and may not have been attributable to the negative feedback delivered at the end of the task. Also as aforementioned, bias in sampling of parents, as well as the shortcomings of the EE measure used, may have led to an underestimation of the levels of parental criticism to which bipolar subjects were exposed. Future studies with multiple task conditions, the necessary inclusion of all caregivers, and a more in-depth measure of EE, such as the Camberwell Family Interview, would be helpful in clarifying these questions.

Summary and Implications for Treatment

Overall, the present study provides evidence that in young adults with bipolar disorder, caregiver-subject relationship variables and emotion dysregulation are linked, beyond a correlation with mood symptoms. Two different theories that might explain this link are offered. The first is the BAS dysregulation model of bipolar disorder, which posits that BAS sensitivity in bipolar subjects interacts with BAS-relevant stimuli both within and outside the family environment. A number of findings in the present study support this model. Bipolar subjects exhibited higher levels of self-criticism and emotional reactivity to negative feedback than controls. Additionally, a subset of bipolar subjects exhibited a tendency to perceive a lack of paternal warmth as lack of care, and this perceived low paternal care was related to emotional reactivity to negative feedback. Contrary to study hypotheses, however, parent-subject relationship variables and increased emotional reactivity to negative feedback were not related to BAS-relevant cognitive schema of self-criticism and perfectionism. This does not support the BAS

dysregulation model, and invokes the need for an alternate explanation of the current findings.

An alternate explanation of the current findings is that low perceived paternal care and caregiver EOI/borderline EOI are indicative of disturbances in parent-subject attachment. Insecure attachment, in turn, has been associated with emotion dysregulation, and, therefore, may mediate the link between parent-subject relationship disturbances and emotional reactivity to negative environmental stimuli in the present study. This suggests the need for further investigation of the impact of parental relationships on adult attachment style, and the effect of attachment style on emotion regulation, in bipolar adults.

The link in the present study between perceived paternal care and emotional reactivity to negative feedback corroborates previous findings regarding the importance of care, warmth and positive communication in patient relationships with caregivers. Investigators have called for further examination of family positivity and warmth as it relates to the expressed emotion (EE) construct (e.g., Chambless et al., 1999). In one study of family therapy in a sample of bipolar adults, increases in positive communication mediated the effect of family-based intervention on improved symptom trajectories (Simoneau et al., 1998). Additionally, in a longitudinal study of children with a diagnosis of bipolar I disorder, low maternal warmth at baseline predicted relapse to mania and more weeks spent ill with manic episodes, even at 8-year follow-up (Geller, Tillman, Bolhofner, & Zimerman, 2008). Taken together, these findings suggest that one important focus of family-based intervention for bipolar disorder should be building attachment, warmth, and positive communication in caregiver-patient relationships.

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Table 1. Descriptive Statistics: Clinical Sample (n=20)

	Mean	Std. Deviation
YMRS	3.55	3.502
HDRS	5.15	4.464
Global Assessment of Functioning	46.15	4.591
Age of Onset - Depression	18.21	4.541
Age of Onset- Mania	19.60	4.083
Number of Depressive Episodes*	2.42	1.730
Number of Manic Episodes**	2.08	1.188
Number of Psychiatric Hospitalizations***	3.00	3.018
Number of Suicide Attempts	0.75	1.020
Number of Current Psychotropic Medications	3.15	1.531

*8 subjects reported a chronic depressive mood course and were not included in this average
**7 subjects reported a chronic manic/hypomanic mood course and were not included in this average
***1 subject had 26 hospitalizations; this was an outlying value and was not included in this average

Table 2. Correlations with YMRS and HDRS Scores in the Entire Sample

	HDRS (n=20)	YMRS (n=20)
DAS-P	.294	.094
DEQ-SC	.482**	.265
PA-Pre	-.402*	-.040
NA-Pre	.754**	.226
PA-Post	-.371*	-.229
NA-Post	.439**	.229
PA-Res	-.090	-.319*
NA-Res	-.119	.099
PC-Maternal	-.082	.155
PC-Paternal	.019	.211
Care-Maternal	.006	-.122
Care-Paternal	-.133	-.020
Activities-Maternal	.055	.381*
Communication Quantity-Maternal	.089	.349*
Communication Hostile-Maternal	.253	.387*
Overall Warmth-Maternal	-.267	-.047
Overall Tense-Maternal	.157	.291
Activities-Paternal	-.168	.099
Communication Quantity-Paternal	-.163	.227
Communication Hostile-Paternal	.371*	.455*
Overall Warmth-Paternal	-.455**	-.265
Overall Tense-Paternal	.380*	.527**

Note: YMRS = Young Mania Rating Scale; HDRS = Hamilton Depression Rating Scale; DAS-P = Dysfunctional Attitudes Scale – Perfectionism; DEQ-SC = Depressive Experiences Questionnaire – Self-Criticism; PA-Pre = Baseline Positive Affect; NA-Pre = Baseline Negative Affect; PA-Post = Positive Affect Post Task; NA-Post = Negative Affect Post Task; PA-Res = Positive Affect Residual Change Score; NA-Res = Negative Affect Residual Change Score; PC = Perceived Criticism; Care = Parental Bonding Index –Care; Activities= Psychosocial Schedule- Activities with Caregiver; Communication Quantity= Psychosocial Schedule- Quantity of Communication with Caregiver; Communication Hostile = Psychosocial Schedule- Amount of Tense/Hostile Communication with Caregiver; Overall Warmth = Psychosocial Schedule- Overall Warmth in Relationship with Caregiver; Overall Tense = Psychosocial Schedule- Overall Tension in Relationship with Caregiver. *p≤.05; **p≤.01

Table 3. Comparing Clinical and Control Subjects on Questionnaire Measures

	Clinical (n=20) Mean (SD)	Control (n=20) Mean (SD)
HDRS**	5.15 (4.464)	.90 (1.02)
YMRS*	3.55 (3.502)	1.05 (.9445)
DEQ-SC**†‡	.4183 (1.1206)	-.7137 (.6246)
DAS-P	45.65 (17.33)	41.6 (12.83)
PA-Pre	28.55 (10.22)	29.10 (8.29)
NA-Pre**	17.70 (8.65)	10.80 (1.82)
PA-Post	23.25 (8.65)	26.75 (8.17)
NA-Post**†‡	18.25 (7.39)	11.15 (1.42)
PC-Maternal	4.65 (2.64)	4.30 (2.34)
PC-Paternal	6.00 (3.33)	4.35 (2.62)
Care-Maternal	32.55 (4.16)	32.00 (4.61)
Care-Paternal	23.80 (9.89)	28.25 (6.54)

Note: HDRS = Hamilton Depression Rating Scale; YMRS = Young Mania Rating Scale; DEQ-SC = Depressive Experiences Questionnaire – Self-Criticism; DAS-P = Dysfunctional Attitudes Scale – Perfectionism; PA-Pre = Baseline Positive Affect; PA-Post = Positive Affect Post Task; NA-Pre = Baseline Negative Affect; NA-Post = Negative Affect Post Task; PC = Perceived Criticism; Care = Parental Bonding Index – Care.

*$p<.05$;**$p\leq.001$; †Controlling for HDRS, $p<.05$; ‡Controlling for NA-Pre, $p<.05$

Table 4. Analyses of Covariance: Post-Task Negative Affect

	Clinical (n=20) EMM (SE)	Control (n=20) EMM (SE)	*F*	η^2	*p*
NA-Post	18.25 (7.29)	11.15 (1.42)	17.798	0.319	0.0001
NA-Post[a]	16.54 (1.057)	12.86 (1.057)	5.329	0.126	0.027

Note: NA-Post = Post-Task Negative Affect; NA-Post[a] = Post-Task Negative Affect with Baseline Negative Affect as a covariate; EMM = Estimated Marginal Mean; SE = Standard Error.

Table 5. Correlations Among Variables in the Clinical Sample

	YMRS (n=20)	HDRS (n=20)	PA-Pre (n=20)	NA-Pre (n=20)	PA-Res (n=20)	NA-Res (n=20)	DAS-P (n=20)	DEQ-SC (n=20)	PC-Ma (n=20)	PC-Pa (n=19)	Care-Ma (n=20)	Over-Ma (n=20)	Care-Pa (n=20)	Over-Pa (n=20)	Warm-P (n=12)	Warm-M (n=18)	Pos-P (n=12)	Pos-M (n=18)
YMRS	1																	
HDRS	.122	1																
PA-Pre	.053	-.576**	1															
NA-Pre	.011	.676**	-.346	1														
PA-Res	-.248	.129	-.218	-.145	1													
NA-Res	-.041	-.380	.488*	-.186	-.674**	1												
DAS-P	.004	.315	-.317	.452*	-.089	-.042	1											
DEQ-SC	-.027	.316	-.312	.423	-.205	.106	.818**	1										
PC-M	.193	-.076	.101	.350	-.072	-.192	.219	.161	1									
PC-P	.165	-.134	.100	.386	-.367	.278	.600**	.646**	.540*	1								
Care-M	-.246	-.138	.204	-.304	.013	.272	-.207	-.019	-.460*	-.188	1							
Over-M	.170	-.310	.110	-.061	.153	-.184	-.251	-.318	.592**	.162	-.139	1						
Care-P	.160	-.041	.103	-.360	.578**	-.453*	-.413	-.426	-.035	-.557*	.135	-.028	1					
Over-P	.277	-.182	.003	-.153	-.227	.285	.266	.383	-.110	.511*	.126	.019	-.355	1				
Warm-P	-.220	-.541	.437	-.558	.256	.045	-.197	-.252	.263	-.274	-.013	.034	.811**	-.239	1			
Warm-M	-.124	.093	-.147	-.014	-.075	.147	-.021	-.283	-.496*	-.315	-.168	-.215	-.167	.016	-.089	1		
Pos-P	.122	.238	-.187	.321	-.018	.114	.575	.770**	.166	.217	-.319	-.506	.009	-.104	.158	-.327	1	
Pos-M	.041	-.154	-.064	-.377	-.158	.404	.192	.101	-.518*	-.051	.144	-.201	-.234	.698**	.447	.560*	-.100	1

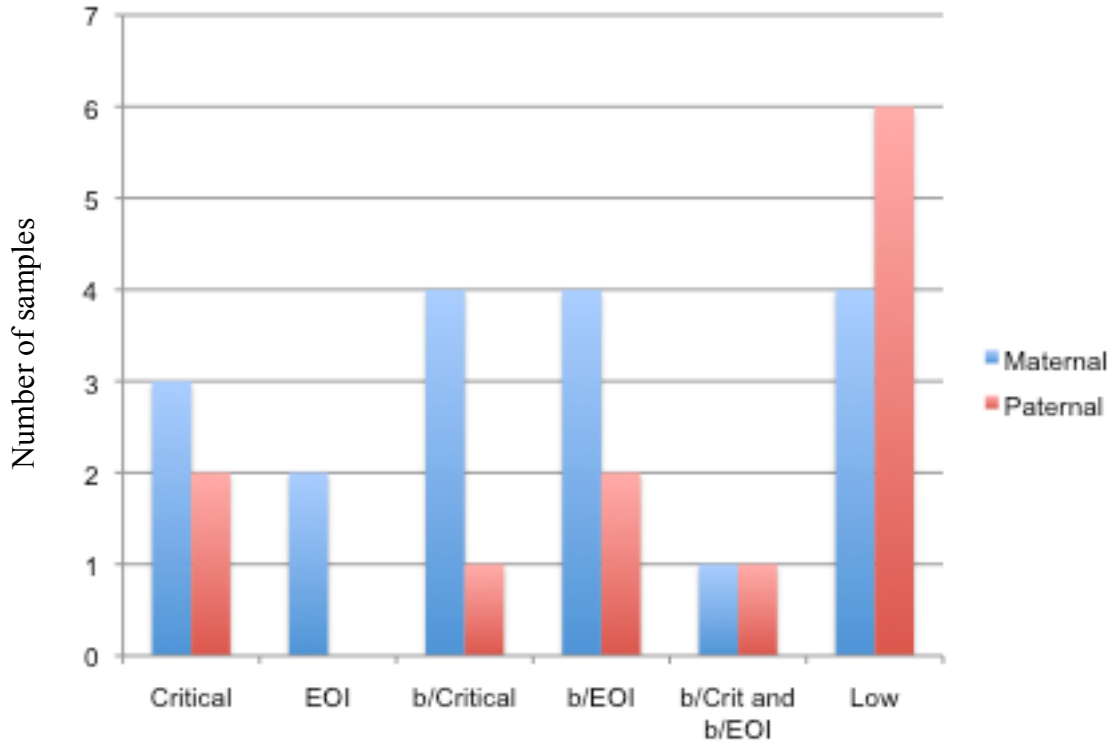
Note: YMRS = Young Mania Rating Scale; HDRS = Hamilton Depression Rating Scale; PA-Pre = Baseline Positive Affect; NA-Pre = Baseline Negative Affect; PA-Res = Positive Affect Residual Change Score; NA-Res = Negative Affect Residual Change Score; DAS-P = Dysfunctional Attitudes Scale – Perfectionism; DEQ-SC = Depressive Experiences Questionnaire – Self-Criticism; PC-Ma = Perceived Criticism – Maternal; PC-Pa = Perceived Criticism – Paternal; Care-Ma = Parental Bonding Index – Maternal Care; Over-Ma = Parental Bonding Index – Maternal Overprotection; Care-Pa = Parental Bonding Index – Paternal Care; Over-Pa = Parental Bonding Index – Paternal Overprotection; Warmth-P = Five Minute Speech Sample – Paternal Warmth; Warmth-M = Five Minute Speech Sample – Maternal Warmth; Pos-P = Five Minute Speech Sample – Paternal Positive Remarks; Pos-M = Five Minute Speech Sample – Maternal Positive Remarks

Table 6. Predictors of Negative Affect Residual Change Scores in Clinical Subjects

Variable	B	SE B	β	*t*	Sig.
Paternal PBI-Care	-.047	.027	-.353	-1.75	0.098
EOI/bEOI	1.031	.524	.397	1.967	0.066

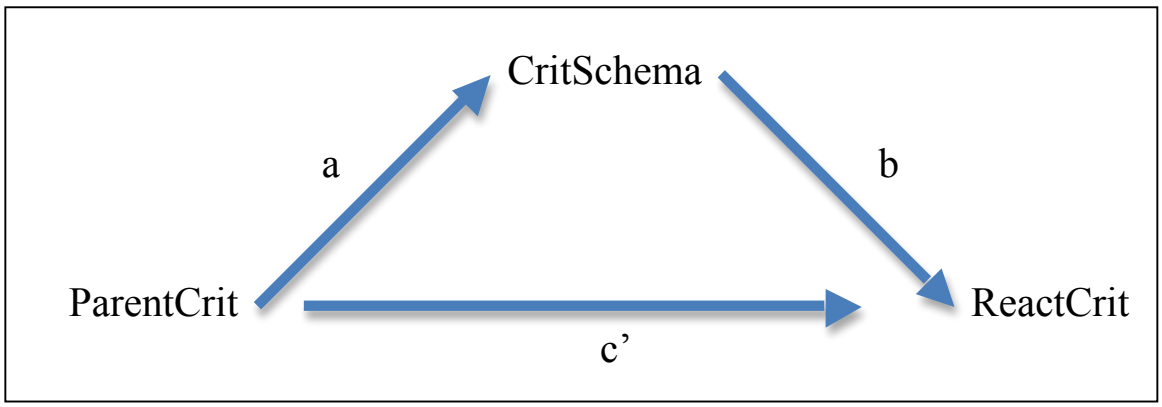
Note: PBI = Parental Bonding Index; EOI/bEOI = FMSS Emotional Overinvolvement and borderline Emotional Overinvolvement.
R^2= 0.353, *p*=.025

Figure 1. Five Minute Speech Samples- Expressed Emotion Ratings



Note: EOI = Emotionally Overinvolved, b/Critical = borderline Critical, b/EOI = borderline Emotionally Overinvolved

Appendix A.



Note. Illustration of the hypothesized model for bipolar subjects. ParentCrit= criticism in caregiver-patient relationship, CritSchema = cognitive schemas of self-criticism and perfectionism, ReactCrit = negative emotional reactivity to criticism.