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ORIGINAL ARTICLE

Self-esteem Reactivity Among Mothers of Children with Attention-Deficit/Hyperactivity Disorder: The Moderating Role of Depression History

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Abstract This study examined self-esteem reactivity to a variety of contextual cues in a sample of women prone to depression. Participants were 49 mothers of children with attention-deficit/hyperactivity disorder. Across a 9-month time-period, participants completed weekly measures of self-esteem, perceived stress, positive and negative affect, and child disruptive behavior. Results indicated that mothers reported lower self-esteem during weeks they experienced greater stress, lower positive affect, higher negative affect, and more inattentive, overactive, and oppositional behavior in their children. Depression history moderated these relationships such that mothers with prior histories of depression reported greater self-esteem reactivity to these cues than never depressed mothers.

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Introduction

Beck's cognitive theory of depression (1967) as well as the mood-state hypothesis of Teasdale (1983, 1988) and others (Persons and Miranda 1992; Segal and Ingram 1994) propose that among depression-prone individuals, underlying negative cognitions such as low self-esteem are latent structures that lie dormant until they are activated or 'primed' by dysphoric mood-states or stressful events. Low self-esteem, or a negative view of one's self, is an important cognitive structure that comprises one of the three major components of Beck's (1967) cognitive triad (i.e., negative view of self, world, and future) thought to predispose individuals to experience depression (Sowislo and Orth 2013). Individuals with low self-esteem tend to see themselves as defective, inadequate, and unworthy, and tend to report a negative global self-evaluation (Rosenberg 1965; Swann et al. 2007). Once an individual is primed by negative mood-states or stress, the patterns of information processing that subsequently occur determine whether or not initial dysphoria escalates into a prolonged and more severe episode of depression (Teasdale 1983, 1988). This premise is supported by repeated findings suggesting that individuals who are vulnerable to depression, such as those with histories of depression (i.e., *previously depressed individuals*), tend to evidence low self-esteem or other forms of negative self-schemata in the context of dysphoric moods or elevated stress, but report seemingly normal levels in affectively neutral or stress-free situations (Persons and Miranda 1992; Roberts and Kassel 1996; Teasdale and Dent 1987). Thus, previously depressed individuals are

thought to exhibit temporally unstable self-esteem that is highly reactive to internal and external contextual cues such as negative mood-states and/or stressful daily events (Barnett and Gotlib 1988). In contrast, individuals who have never experienced an episode of depression (i.e., *never depressed individuals*) are posited to have more temporally stable self-esteem that is less reactive to affective and stress cues (Roberts and Monroe 1994).

Over the past two decades, researchers have concluded that individuals differ in both their general level of self-esteem (i.e., low/high self-esteem), as well as the extent to which their self-esteem fluctuates in response to stress and negative mood-states (i.e., self-esteem reactivity or self-esteem variability). According to Barnett and Gotlib (1988), those vulnerable to depression are hypothesized to exhibit temporally unstable self-esteem that is highly reactive to daily events and experiences. In contrast, individuals with more temporally stable self-esteem are thought to be less reactive and thus less vulnerable to depression (Barnett and Gotlib 1988; Roberts and Monroe 1994). Thus, self-esteem reactivity, as opposed to mere level, may be an important vulnerability factor for depression (Butler et al. 1994; Kernis and Waschull 1995; Roberts and Monroe 1992; Swann et al. 2007).

Theoretical work across several orientations supports the notion that reactive self-esteem is related to depression (see Roberts and Monroe 1994). According to both psychoanalytic and cognitive theorists, those vulnerable to depression are overly dependent on external sources of self-worth. That is, depression-prone individuals have a greater tendency to define and maintain their self-worth based on the perceived love and approval they receive from others or from their accomplishments and achievements (Beck 1983; Blatt et al. 1982). When depression-prone individuals experience a disappointment or loss in either one of these domains, they are believed to overreact, their self-esteem subsequently plummets, and depression ensues. Thus, the vulnerability factor as it relates to self-esteem may be the depression-prone individual's inability to maintain healthy stable positive self-regard when faced with disappointment, loss, shame or embarrassment.

Taken together, this body of work suggests that self-esteem reactivity, as opposed to mere level, increases risk for subsequent depression. However, the majority of published studies in this domain have been conducted with unselected samples of college students (Butler et al. 1994; Hayes et al. 2004; Oosterwegel et al. 2001; Roberts and Gotlib 1997; Roberts and Kassel 1997; Roberts and Monroe 1992) and the dynamics of self-esteem may be quite different in more clinically-relevant populations. Recent studies using clinical samples of depressed patients have shown that self-esteem reactivity is associated with both depression history and future depressive symptoms (Cummings et al. 2012; Franck and De Raedt 2007). To understand the role of self-esteem reactivity and depression history more clearly, replication of these findings in other clinical samples is needed.

One such clinically relevant sample includes an understudied population of women who are at heightened risk for experiencing depression and stressful events that may impact their perceptions of self-worth–specifically mothers of children with attention-deficit/hyperactivity disorder (ADHD). Compared to mothers of non-ADHD comparison children, mothers of children with ADHD are at greater risk for depression (Chronis et al. 2003; Johnston and Mash 2001). In fact, 50 % of these mothers report a lifetime major depressive disorder (Chronis et al. 2003). Examining depression among mothers of children with ADHD is important, given the clinical implications for both mother and child. Emerging research suggests that maternal depression is negatively associated with children's responses to parent training interventions and is positively associated with the development of conduct problems later in childhood (Chronis et al. 2007), purportedly because parental psychopathology interferes with effective implementation of behavior management skills. According to the transactional model of depression (Chronis-Tuscano and Clarke 2008), maternal depression and child externalizing behavior exert reciprocal influences on each other, and both can serve to maintain and exacerbate the other via negative parent–child interactions (Nicholson et al. 2011). These negative parent–child interactions are stressful, and experimental studies have shown that parents report elevated levels of distress (i.e., greater anxiety, depression, and hostility) and decreased levels of parental competence (i.e., parental ineffectiveness and unsuccessfulness) following encounters with children who engage in deviant behavior (Pelham et al. 1997). Thus, the high prevalence of lifetime depression among mothers of children with ADHD coupled with the ongoing stress of parenting a child with behavior problems provides an ideal opportunity to test the degree to which depression history moderates self-esteem reactivity in a sample of women vulnerable to depression. By examining the self-esteem dynamics of mothers of children with ADHD and elucidating how maternal history of depression may influence those dynamics, we hope to inform the development of more comprehensive treatments approaches for families of children with ADHD (see Chronis et al. 2004).

Prior studies have primarily focused on negative mood-state as the cognition-activating "prime" and have used largely cross-sectional designs (Persons and Miranda 1992; Roberts and Kassel 1996; Teasdale and Dent 1987). However, several recent studies suggest the value of prospective designs that assess additional contextual cues, such as stressful life experiences, when evaluating the

moderating role of individual difference variables in studies of self-esteem reactivity (Dasch et al. 2008; Nezlek and Gable 2001).

The present study examines whether previously and never depressed mothers differ in either their level of self-esteem or in the reactivity of their self-esteem to a variety of contextual cues in a unique sample of women prone to elevated levels of stress and depression. In addition to positive and negative affect, we included contextual cues thought to be particularly relevant for mothers of children with behavior problems. These additional contextual cues included mothers' perceptions of environmental stress and their children's inattentive/overactive and disruptive behaviors. Using a sample of mothers of children with ADHD, we investigated the degree to which mothers' self-esteem is associated with changes in their perceptions of general environmental stress, their mood, and their children's inattentive and disruptive behaviors over an extended 9-month timeframe, and examined the extent to which these associations are moderated by mothers' depression histories. Likewise, we tested whether a past history of depression would be associated with lower overall level of self-esteem. We hypothesized that mothers with past histories of depression would report stronger associations between their self-esteem and these contextual cues (i.e., perceived stress, positive and negative affect, child inattention/overactivity, child opposition) compared to never depressed mothers, but that depression history would not be associated with differences in overall level of self-esteem.

Method

Participants

Study procedures have been described in detail elsewhere (Chronis et al. 2006) and were approved by the University at Buffalo's institutional review board. Over a three-year time period (1998–2000), participants were recruited from families who participated in the summer treatment program (STP) at the University at Buffalo. The STP is an eight-week clinical intervention for children with ADHD and associated learning and behavior problems (Pelham et al. 2004). Prior to enrollment in the STP, all the children of mothers who participated in the study were diagnosed with ADHD according to Diagnostic and Statistical Manual of Mental Disorders, fourth edition (DSM-IV; American Psychiatric Association 1994) criteria. Children ranged in age from 5 to 13 ($M = 9.48$) years at the time of their enrollment in the STP. During the final week of the STP, mothers were invited to participate in a randomized controlled trial of a 12-week psychoeducational group that taught cognitive-behavioral skills to manage stress and depression associated with parenting a child with ADHD (Chronis et al. 2006). The sole inclusion criterion was that participants needed to be mothers of children with ADHD who recently completed the STP. Exclusion criteria were: non-English speaking, active psychosis, history of schizophrenia or bipolar disorder, and active suicidality.

Sixty mothers agreed to participate, provided informed consent, and completed an initial diagnostic assessment. Of the 60 original participants, 51 (85.0 %) completed the diagnostic interviews, weekly measures and questionnaire batteries used in the present investigation. Consistent with a remitted depression paradigm which is often used to investigate cognitive vulnerability factors for depression (see Just et al. 2001, for a critical review), mothers who met DSM-IV criteria for current major depression were excluded from the analyses. Of the original group of 51 mothers who participated, 2 (3.9 %) were excluded from the analyses on the basis of a current major depression diagnosis at baseline. Mothers who met criteria for Dysthymic Disorder ($n = 4$) were retained in the analyses. Thus, the sample for the present study consisted of 49 women. Twenty-three mothers were recruited in Year 1 (14 were randomly assigned to the immediate treatment group, 9 to the wait-list control), 11 in Year 2 (3 immediate treatment group, 8 wait-list control group), and 15 in Year 3 (9 immediate treatment group, 6 wait-list control group). Differences in participant allocation to the immediate treatment groups versus the wait-list control groups in Years 2 and 3 were due to limitations in therapist availability and group capacity.

The 49 participants were predominantly middle-aged ($M = 41.1$ years, $SD = 6.4$) and Caucasian (96.1 %). The majority (90 %) were married, and most (86 %) completed at least some college. At baseline, 20 (40.82 %) women described depressive symptoms that met DSM-IV criteria for lifetime major depression and were thus classified as *previously depressed*. The remaining 29 (59.18 %) women denied ever experiencing clinical levels of depression and were classified as *never depressed*. Previously depressed mothers did not differ from never depressed mothers on any of the key demographic variables assessed including: age ($r = -.22$, $p = .13$), child's age ($r = -.16$, $p = .28$), education ($r = -.00$, $p = .99$), household income ($r = -.16$, $p = .32$), and marital status ($\chi^2 = .84$, $p = .93$).

Procedure

Immediately prior to their invitation to participate in the study, participants' children completed an intensive 8-week behavioral summer treatment program (STP; for detailed descriptions of the program, see Chronis et al. 2004; Pelham et al. 2004). During the STP, parents (including the mothers in the current study) attended weekly group parent

training classes that were based on the Community Parenting Education Program (Cunningham et al. 1994). Mothers who participated in the current study initially attended a screening visit during which time they completed a 2 hour-long diagnostic interview with an advanced clinical psychology doctoral student trained in the administration of the Structured Clinical Interview for DSM-IV (SCID-I: First et al. 1996) and supervised by a clinical psychologist. Following the screening assessment, mothers were randomly assigned to either an immediate treatment or wait-list control group. All participants in the current study received a modification of Lewinsohn's 12-week Coping With Depression Course (CWDC; Lewinsohn et al. 1984) at one point during their 36-week assessment period. Mothers assigned to the immediate treatment group participated in the 12-week CWDC from September through November (corresponding to weeks 1–12); mothers assigned to the wait-list control group participated in the CWDC from March through May (corresponding to weeks 24–36). The CWDC is an empirically supported group treatment for depression that emphasizes the relationships between thoughts, feelings, and behaviors. Groups were organized into four treatment modules (relaxation training, increasing pleasant events, cognitive restructuring, and social skills/assertiveness training). Minor modifications to the CWDC were made to make the material more relevant for mothers of children with ADHD. In particular, parallels were drawn between the behavioral principles taught in the CWDC and those discussed during the STP parent training program (see Chronis et al. 2006 for a complete description). Treatment groups included 4–9 participants and were conducted by advanced doctoral students in clinical psychology who were supervised by a Ph.D. level clinical psychologist with expertise in the CWDC. On average, participants attended 9.5 ($SD = 2.6$) of 12 CWDC sessions.

Participants completed weekly measures of self-esteem, perceived stress, positive and negative affect, and child disruptive behavior throughout the 36-week duration of the study. Mothers were instructed to complete one weekly packet every Sunday evening at approximately the same time each week. The following Monday, participants either provided their responses over the telephone on the study phone line or faxed their completed packets to the laboratory. Participants who did not call or fax their weekly responses by Monday afternoon were given phone call reminders by study staff.

Measures

Lifetime Major Depression History

The Structured Clinical Interview for DSM-IV (SCID-I: First et al. 1996) was used to assess participants' current and worst lifetime experiences of depressive symptoms. Lifetime major depression was defined as having at least 1 major depressive episode over the life course without a history of manic, mixed, or hypomanic episodes. The DSM-IV major depression diagnosis excludes episodes that are due to substance abuse, general medical conditions, or bereavement (American Psychiatric Association 1994). The test–retest reliability and validity of the SCID-I measures of lifetime major depression are good to excellent (Zanarini and Frankenburg 2001).

Self-esteem

The Rosenberg Self-Esteem Scale (RSE; Rosenberg 1965) is a 10-item face-valid measure of global self-regard. Weekly, participants were asked to complete the items based on how they felt about themselves during the previous week. Participants responded to items (e.g., "On the whole, I am satisfied with myself") using a 5-point scale that ranged from strongly agree (1) to strongly disagree (5), with higher scores indicating higher global self-esteem. The RSE has been widely used to measure fluctuations in self-esteem over time (Johnson et al. 2000; Trzesniewski et al. 2003). In the present study, Cronbach's alpha was .92 (averaged across the 36-weeks of data collection).

Perceived Stress

The Perceived Stress Scale (PSS; Cohen et al. 1983) is a 14-item self-report instrument that measures the degree to which situations in one's life are perceived as stressful. For this study, participants rated how often they felt or thought a certain way during the past week, using a 5-point scale ranging from never (0) to very often (4). For example, one item on the PSS inquires how often during the past week the participant "felt nervous or stressed". Higher scores indicate greater perceived stress. The PSS has been shown to be a distinct construct from depression and to be sensitive to treatment effects (Cohen et al. 1983). In the present study, Cronbach's alpha was .90 (averaged across the 36-weeks of data collection).

Positive and Negative Affect

Watson et al. (1988) created the Positive Affect Negative Affect Schedule (PANAS) to provide a quick, reliable, and valid assessment of mood. The PANAS consists of two 10-item mood scales that represent the dimensions of Positive Affect and Negative Affect. The Positive Affect (PA) subscale represents the extent to which one feels a zest for life, and is most clearly defined by descriptions such as: active, delighted, interested, enthusiastic, and proud (Watson et al. 1988). The Negative Affect (NA)

subscale represents the extent to which a person is feeling upset, distressed, or unpleasantly engaged rather than peaceful. Participants indicated to what degree the mood items described their feelings during the previous week using a 5-point scale that ranged from very slightly (1) to extremely (5). Higher scores on each subscale indicate higher positive and negative affect, respectively. The PANAS has good convergent and discriminant validity (Watson et al. 1988). In the present study, Cronbach's alphas were .94 and .89 for PA and NA, respectively (averaged across the 36-weeks of data collection).

Child Disruptive Behavior

The IOWA Conners rating scale is a widely-used measure that consists of two, 5-item subscales reflecting the dimensions of inattention/overactivity (IO) and oppositional/defiant (OD) behavior (Loney and Milich 1982; Pelham et al. 1989). Each week, mothers rated the degree to which each item (e.g., "fidgeting") described their child's behavior during the previous week using a 4-point scale, ranging from not at all (0) to very much (3). Higher scores indicate greater behavioral problems. The subscales of the IOWA Conners have excellent psychometric properties, with strong convergent and discriminant validity (Pelham et al. 1989). In the present study, Cronbach's alphas were .82 and .90 for the IO and OD scales, respectively (averaged across the 36-weeks of data collection).

Depressive Symptom Severity

Participants' weekly depressive symptom severity was also assessed throughout the duration of the study using the Beck Depression Inventory (BDI; Beck 1967; Beck et al. 1961), a 21-item self-report instrument. For each item, participants were instructed to select one of four statements that most accurately described their depressive symptoms during the preceding week (e.g., "I do not feel sad" vs. "I feel sad" vs. "I am sad all the time and I can't snap out of it" vs. "I am so sad or unhappy that I can't stand it"). Greater scores on the BDI indicate a greater degree of depressive symptoms. The BDI has high internal consistency in both clinical and non-clinical samples (Beck et al. 1988). In the present study, Cronbach's alpha was .88 (averaged across the 36-weeks of data collection).

Results

Data Analytic Plan

To examine our hypotheses, a series of multilevel models were tested using the non linear mixed effects package (Pinheiro and Bates 2000) run in R 2.0 (R Core Development Team 2012). Multilevel modeling is ideal for simultaneously estimating variation among within-subjects and between-subjects variables in data sets with repeated measurements (Singer and Willett 2003). This analytic approach makes use of all available within-subjects data and weights the impact of between-subjects data as a function of how much within-subjects data each participant contributed. In the presence of missing data, data from each individual are weighted by the inverse of their respective variances, functionally leading persons with fewer observations to be less influential in the analysis (Singer and Willett 2003). To test our hypotheses, multilevel models included depression history as a Level 2 predictor, each of our contextual cues (i.e., perceived stress, positive affect, negative affect, child inattention/overactivity, child opposition) as a Level 1 predictor, a cross-level interaction term between depression history and each contextual cue, and weekly self-esteem as the outcome of interest. The cross-level interaction tested whether weekly self-esteem reactivity differed as a function of depression history, whereas the main effect of depression history tested whether or not previously and never depressed mothers differed in their level of self-esteem during weeks when they were experiencing average levels of each contextual cue. All assessment points (weeks 1–36 over the 36-week assessment period) were used in the present study.

Preliminary Analyses

T tests and Chi square analyses were conducted to compare the 49 participants to the 11 mothers who initially agreed to participate but did not complete the measures of interest for this study. Participants did not differ from non-participants on any demographic or clinical variables, including maternal age, education, family income, maternal work status, marital status, history of depression, or child disruptive behavior (*p*s ranged from .15 to .73).

Across the 36-week study period, participants provided 1,408 points of data, and completed an average of 86.0 % of their weekly ratings. Rates of missing data for the weekly measures ranged from 0.0 % at Week 1 to 43.1 % at Week 36, reflecting a general positive trend for missing data over time. On average, 18.6 % of the data were missing between weeks 2 and 36.

Preliminary analyses were conducted to examine if there were systematic changes in mothers' self-esteem as a function of time. To examine this, we tested a model examining the linear and quadratic effects of time (week in study) on self-esteem. Significant linear ($b = .11$, $p < .01$) and quadratic ($b = -.0023$, $p < .05$) effects were observed such that mothers' self-esteem increased over the course of the study period. Consequently, both the linear and

quadratic effects of time were included as covariates in subsequent models. In addition, all subsequent analyses included mothers' average weekly BDI scores as a covariate in the first level of the model in order to control for individual differences in current depressive symptomatology.

Because data for this study were collected during the course of a treatment study, we also conducted additional analyses that included treatment exposure in the model. To assess the effects of treatment exposure, weekly data were dummy coded to reflect whether the participant had received treatment (or not) on a week-by-week basis throughout the 36-week treatment period. Thus, assessment points were equivalent regardless of whether participants were assigned to the immediate treatment or waitlist control group. Results from models that included treatment exposure did not differ from the original models. For simplicity, only the results from the original models are presented below.

The Moderating Effect of Depression History on the Association Between Self-esteem and Perceived Stress

Consistent with our hypotheses, the main effect of depression history on self-esteem was not statistically significant, $b = -.95, t(46) = -.71, p = .48$. However, the main effect of perceived stress was significant, $b = -.36$, $t(1,355) = -.28$, $p < .001$, such that mothers endorsed lower self-esteem during weeks when they reported greater amounts of perceived stress. As hypothesized, analyses revealed a significant Depression History × Perceived Stress interaction on self-esteem, $b = -.10$, $t(1,355) = -4.07$, $p < .001$. Simple slope analyses indicated that the association between perceived stress and self-esteem was greater among mothers with histories of depression, $b = -.31, t(1,355) = -16.96$, $p < .001$, than those without depression histories, $b = -.21$, $t(1,355) = -5.20, p < .001$.

The Moderating Effect of Depression History on the Association Between Self-esteem and Positive and Negative Affect

The main effect of depression history on self-esteem did not reach significance in either the positive affect, $b = -1.85$, $t(46) = -1.44$, $p = .16$, or negative affect, $b = -.66$, $t(46) = -.49$, $p = .63$, models tested. However, the main effects of positive affect, $b = .34$, $t(1,355) = 20.71$, $p < .001$, and negative affect, $b = -.36, t(1,355) = -20.96$, $p < .001$, on self-esteem were significant, such that mothers endorsed greater self-esteem during weeks when they reported more positive affect and less negative affect. Analyses also revealed that the hypothesized Depression History × Positive Affect interaction, $b = .16$, $t(1,355) = 5.09$, $p < .001$, and Depression History × Negative Affect interaction, $b = -.17, t(1,355) = -5.17, p < .001$ were statistically significant. Simple slope analyses indicated that the positive association between positive affect and self-esteem was stronger among mothers with a history of depression, $b = .27$, $t(1,355) = 12.37$, $p < .001$, compared to never depressed mothers, $b = .10, t(1,355) = 2.12, p < .05$. Likewise, negative affect was associated with lower self-esteem to a greater degree among previously depressed mothers, $b = -.29, t(1,355) = -13.01$, $p < .001$, compared to never depressed mothers, $b = -.12, t(1,355) = -2.50, p < .05$ (see Fig. 1).

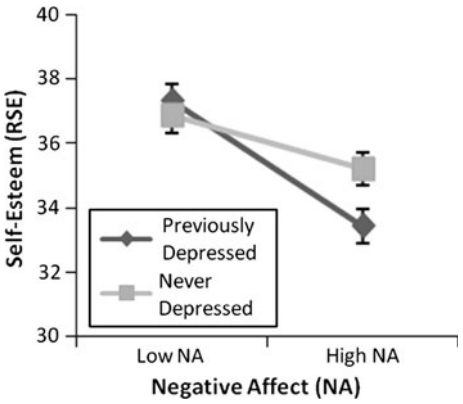

Fig. 1 Moderating effect of depression history on the associations between mothers' self-esteem and negative affect. *Vertical lines* depict standard errors of the predicted means

The Moderating Effect of Depression History on the Association Between Self-esteem and Child Disruptive Behavior

Consistent with our hypotheses, the main effect of depression history on self-esteem did not reach significance in either the inattention/overactivity (IO), $b = -.57$, $t(46) = -.42$, $p = .68$, or oppositional/defiant (OD), $b = -.87$, $t(46) = -.62$, $p = .54$, models tested. In contrast, the main effects of IO, $b = -.26$, $t(1,355) = -5.10$, $p < .001$, and OD, $b = -.27$, $t(1,355) = -6.82$, $p < .001$, on self-esteem were significant, such that mothers endorsed greater self-esteem during weeks when they reported less disruptive behavior by their children. Of most importance, the hypothesized Depression History × Child IO interaction, $b = -.24, t(1,355) = -2.24, p < .05$, and Depression History × Child OD interaction, $b = -.24$, $t(1,355) = -2.79$, $p < .01$ were statistically significant. Simple slope analyses revealed that the associations between weekly self-esteem and child IO behaviors were stronger among mothers with histories of depression, $b = -.17, t(1,355) = -2.56$, $p < .05$, compared to those without a history of depression, $b = .07$, $t(1,355) = .47$, $p = .64$ (see Fig. 2). Likewise, simple slope analyses indicated that the

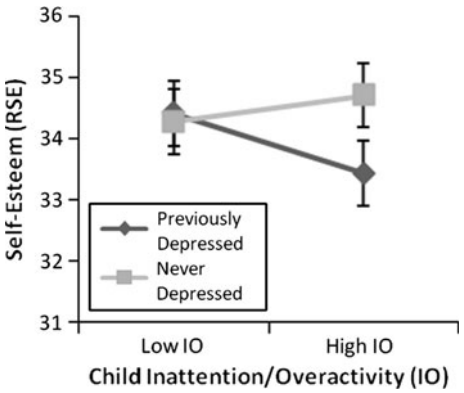

Fig. 2 Moderating effect of depression history on the associations between mothers' self-esteem and their children's inattention and overactivity (IO). *Vertical lines* depict standard errors of the predicted means

association between weekly self-esteem and child OD behaviors was stronger among mothers with a past history of depression, $b = -.19$, $t(1,355) = -4.03$, $p < .001$, compared to those without such a history, $b = .04$, $t(1,355) = .37$, $p < .71$. Mothers with histories of depression endorsed lower self-esteem during weeks when they reported more inattention/overactivity and oppositional/defiant behaviors in their children compared to the never depressed mothers.

Supplemental Analyses

A small subsample of women ($n = 4$) in the study met diagnostic criteria for Dysthymic Disorder. Although we statistically controlled for mothers' current depressive symptoms in the models, we conducted additional analyses to investigate the degree to which our findings remained when the 4 women with dysthymia were excluded from the analyses. Results from these analyses ($N = 45$) were not substantially different from those conducted on the entire sample ($N = 49$).

Discussion

The present study examined self-esteem reactivity in mothers of children with ADHD, a sample of women at heightened risk for both elevated stress and depression. Specifically, we examined the extent to which mothers' self-esteem was associated with a variety of stress, mood, and child misbehavior cues over an extended 9-month timeframe. Results from the study indicate that mothers of children with ADHD tend to report lower self-esteem during weeks when they experience greater stress, lower positive affect, higher negative affect, and more inattentive and oppositional behavior in their children. Perhaps most importantly, maternal depression history moderated these relationships, such that previously depressed mothers evidenced greater self-esteem reactivity in the context of inattentive and oppositional child behavior than never depressed mothers. Although the data suggest that on average, mothers with a prior history of depression do not experience lower levels of self-esteem as compared to mothers without a prior history of depression, our findings suggest that the self-esteem of previously depressed mothers may be more reactive to the stresses associated with more difficult child behavior than the self-esteem of mothers with no prior history of depression.

More broadly, these findings extend prior research supporting the mood-state hypothesis (Fresco et al. 2006; Teasdale 1983, 1988; Persons and Miranda 1992; Segal and Ingram 1994) to a clinically relevant population of women at risk for depression. Similar to the findings reported in studies examining self-esteem reactivity among previously and never depressed college students (Butler et al. 1994; Hayes et al. 2004; Roberts and Gotlib 1997; Roberts and Kassel 1997), we found that the self-esteem of mothers with depression histories was more reactive to internal (perceived stress, positive and negative affect) and external (child inattention/overactivity, child oppositional/defiant behavior) contextual cues than the self-esteem of never depressed mothers. Our findings are consistent with the idea that self-esteem reactivity serves as a trait vulnerability characteristic to depression, whereas low levels of self-esteem do not play a role in risk for depression.

Of particular note, we found that mothers' self-esteem was significantly associated with child inattention/overactivity and oppositional/defiant behavior among the mothers with prior histories of depression, but not among the never depressed mothers. It is well-established that mothers of children with ADHD tend to view themselves as less-skilled and report less satisfaction from their parenting experiences compared to parents of non-ADHD comparison children (Mash and Johnston 1983). Our results suggest that mothers of children with ADHD with a lifetime history of major depression may be even more self-critical than their never-depressed counterparts. Because ADHD behaviors in children have been shown to be a major contributor to parental stress (Fischer 1990; Pelham et al. 1997; Johnston and Mash 2001), negative affect (Pelham et al. 1997), and self-esteem (Finken and Amato 1993; Johnston and Freeman 1997; Johnston and Mash 1989, 2001), and given that maternal depression predicts adverse developmental and treatment outcomes for children with ADHD (Chronis et al. 2007; Chronis-Tuscano et al. 2010; Owens et al. 2003) it is important for clinicians who treat children with ADHD to assess maternal depression history and consider adjunctive treatment for mothers who have had past depressive episodes.

Our findings suggest that mothers with prior histories of depression experience greater fluctuations in their self-evaluations in relation to their children's behavior and to other perceived stressors in their lives. When mothers with prior histories of depression experience these stressors, their self-esteem is more negatively impacted and their ability to respond consistently to their children's behavior may be affected. When treating mothers of children with ADHD who have prior histories of depression, clinicians may want to consider supplementing behavioral parent training with a cognitive behavioral intervention, like the one developed by Chronis-Tuscano and Clarke (2008). Within this intervention, mothers are taught how to deconstruct stressful events and be less reactive to the vicissitudes of daily life, particularly the daily events typical of households with children with behavioral problems. Perhaps most relevant to mothers' self-esteem reactivity, this intervention helps mothers to challenge their internal attributions for their children's inattentive and disruptive behavior.

Our study benefited from several methodological strengths, including a novel clinically-relevant and well-characterized sample, the use of structured diagnostic interviews to assess depression history, weekly assessments over a 36-week time frame, and advanced statistical modeling procedures that allowed us to examine the contributions of within-subjects and between-subjects effects separately, and include all available data at each time point. However, the limitations of the study also need to be acknowledged.

Definitive conclusions about causal relationships cannot be made with correlational analyses. When considering the relations between self-esteem and each contextual cue (i.e., perceived stress, positive affect, negative affect, and child disruptive behavior), it is important to bear this caution in mind. Although, we conceptualized self-esteem reactivity to be the rate of change in self-esteem for each unit increase in perceived stress, affect, or child-disruptive behavior, because these variables were measured concurrently, we cannot rule out the possibility that self-esteem influenced the ratings of the cues themselves (recall bias) even though repeated measurement over time can increase reliability of assessments and reduce recall bias (Affleck et al. 1999). In addition, all the weekly measures were self-report, and consequently, the findings may have been influenced by shared method variance. Additionally, our sample of mothers of children with ADHD was relatively homogenous with respect to race, ethnicity, education level, and socio-economic status. The majority of mothers in our study were also well-educated, middle to upper-middle class, Caucasian women. It is unclear whether similar findings would emerge among women of color, or among women who are younger or more socio-economically disadvantaged. We also do not know the extent to which our findings are representative of mothers who were recruited for the study, but who elected not to participate. The degree to which our findings generalize to fathers of children with ADHD is also unknown given our exclusive focus on mothers in both this study and the parent study (Chronis et al. 2006). We made the decision to exclude fathers from the parent study because mothers are most often responsible for the organizational aspects of parenting (Furstenberg 1988; McBride and Mills 1993; Parke 1995) and are the focus of much of what is known in the literature on parent training of children with ADHD (Fabiano 2007).

It is also unclear whether similar results would be found if we had used a measure of *parenting* self-esteem to assess how each mother felt about herself as a parent, as opposed to the global self-regard measure we used in this study. Associations between *parenting* self-esteem and child disruptive behavior are well documented among parents of children with ADHD (Johnston and Freeman 1997; Johnston and Mash 1989), but it is unknown whether maternal depression history moderates this association. Additional research should also investigate other potential moderators such as trait neuroticism and a ruminative response style (Hankin et al. 2007). Understanding the processes that underlie self-esteem variability is important because daily affective lability to stress has been shown to predict the development of depressive symptoms (Cohen et al. 2005; Gunthert et al. 2005) and may be particularly relevant for mothers of children with ADHD.

Consistent with the mood-state hypothesis, mothers of children with ADHD reported lower global self-esteem during weeks when they experienced greater stress, less positive affect, more negative affect, and more disruptive behavior in their children. Depression history moderated these relationships such that mothers with prior histories of depression reported greater self-esteem variability in the context of these cues than never depressed mothers. Clinicians who treat children with ADHD may want to include systematic assessments of maternal depression history and consider cognitive treatment approaches for mothers who appear particularly vulnerable to future depressive episodes in response to their children's difficult behavior (Chronis-Tuscano and Clarke 2008).

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