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**Maternal Depression and Children's Adjustment Problems:
The Role of Mothers' Affective Reactivity**

**APPROVED BY
SUPERVISING COMMITTEE:**

Supervisor:

Theodore Dix

Edward R. Anderson

Elizabeth T. Gershoff

**Maternal Depression and Children's Adjustment Problems:
The Role of Mothers' Affective Reactivity**

by

Anat Moed, BA

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Abstract

Maternal Depression and Children's Adjustment Problems:

The Role of Mothers' Affective Reactivity

Anat Moed, MA

The University of Texas at Austin, 2013

Supervisor: Theodore Dix

Mothers with depressive symptoms often express more negative emotions than other mothers, react more punitively, and express more frustration (e.g., Belsky, 1984). Paradoxically, mothers with depressive symptoms are also often found to be less, not more, reactive and to express flat rather than negative affect. These mothers are often described as emotionally "flat", unresponsive, and withdrawn (Kochanska, Kuczynski, Radke-Yarrow, & Welsh, 1987). Mothers' depressive symptoms are also associated with problematic parenting, interfering with children's social development (e.g., Goodman et al., 2011).

This study investigated the possibility that mothers with depressive symptoms regulate their affect as a coping strategy to minimize distress when facing aversive child behaviors. Using observational and reported longitudinal data from 319 mother-child dyads, we examined how mothers' affective reactivity changes as a function of (a)

changes in mothers' depressive symptoms, and (b) changes in children's aversiveness during the course of the mother-child interaction.

Depressive symptoms were associated with mothers' under-reactivity to low aversive child behaviors. Depressive symptoms also predicted rapid increases in mothers' negative reactivity as children's aversiveness increased, and negative over-reactivity to highly aversive child behaviors. Mothers' affective under-reactivity, over-reactivity, and depressive symptoms were all associated with children's adjustment problems over a two-year period.

Results suggest that when aversive child behaviors are minimally disturbing, mothers with depressive symptoms minimize child rearing strain by not reacting; when aversive child behaviors are highly disturbing, they do so by resisting and controlling the child. Findings may enable us to understand adaptations that undermine parenting and place children at risk.

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Introduction

The prevalence of mothers' depressive symptoms and its association with stressful life events, low competent parenting, and problematic child outcomes is well documented. Depressive symptoms are commonly reported as a response to the emergence of stressful life experiences such as financial hardship, divorce, medical problems, and the like. Mothers' depressive symptoms are also associated with problems in parenting, such as intrusiveness, harshness, withdrawal, and unresponsiveness. To explain why depression undermines parenting, researchers propose that it influences mothers' emotional reactivity, that is, *mothers' affective displays in response to child behavior*. Depressive states are thought to reduce the threshold at which negative emotion and associated behaviors are activated. However, this widely invoked mechanism had not been tested explicitly. Furthermore, heightened negative reactivity is inconsistent with evidence that often depressed mothers are not overly emotional and hyper-sensitive, but instead are emotionally flat and unresponsive. In the present study we examine whether (a) depressive symptoms change thresholds for reacting to aversive child inputs, and whether these thresholds can explain both negative over-reactivity and under-reactivity, (b) patterns of negative reactivity predict problematic child adjustment, and (c) mothers' patterns of reactivity mediate the relation between mothers' depressive symptoms and children's adjustment problems.

Depressive Symptoms, Negative Emotions, and Over-Reactivity

Emotional processes that occur while experiencing depressive symptoms may determine the nature of mother-child interactions. Mothers' depressive symptoms are associated with more negative and fewer positive interactions (Cummings & Davies,

1994; Goodman & Brumley, 1990). Dix (1991, 1992) argues that different affective states are likely to accompany different types of parenting goals and concerns during mother-child interactions. Dix, Gershoff, Meunier, & Miller (2004) found that as depressive symptoms increased, mothers were more likely to have self-oriented rather than child-oriented goals and were also less likely to display supportive behavior during mother-child interactions. Depressive symptoms have also been shown to increase mothers' negative appraisals of children (Abramson et al., 1978; Alloy, 1988; Beck, 1967; Beck, 1976). Mothers who attribute their children's problematic behaviors to the child's inherent tendencies may respond with negative affect or harsh discipline (e.g., Bugental & Happaney, 2004; Dix, Ruble, & Zambarano, 1989; Leung & Slep, 2006). Dix (1991) suggests that by increasing negative emotions, depressive symptoms reduce parenting competence and this in turn predicts poor child outcomes. Depressed mothers also evaluate themselves more negatively, they often lack competence to control their child, and, as a result, can react with harsh control, anger and anxiety regardless of the negativity of the child's misbehavior, leading them to resolve problem situations in severe and inappropriate ways (Bugental, Blue, & Cruzcosa 1989; Bugental, 1992).

Nevertheless, current evidence for the association between depressive symptoms and negative reactivity is indirect. Hypersensitivity to negative stimuli, that is, having a low threshold for activation of negative emotion, is said to be a basis for over-reactive discipline and expression of negative emotions. Unlike general negativity, negative reactivity is negativity specifically activated by immediately preceding input. Global tendencies to be negative need not reflect negative reactivity (e.g., Belsky, 1984; Belsky, Robbins, & Gamble, 1984; Frodi & Lamb, 1980;

Weissman & Paykel, 1974). Because research to date has consistently relied on general amount of negativity across extended periods, rather than reaction to aversive inputs, we are unable to truly infer on changes in mothers' reactivity threshold as a function of child behavior. For example, Lahey, Conger, Atkeson and Treiber (1984) suggest that parents who are in distress have a lower threshold for experiencing negative emotions in the presence of child misbehavior and therefore may react more punitively to it. However, the children in their study did not differ on any measure of child behavior. Therefore, it was not possible to determine whether less negative child behavior was eliciting more negativity from more distressed mothers, or whether more distressed mothers were simply more negative independent of particular inputs from their child. However, research to date fails to incorporate, qualitatively and quantitatively, the affective elicitation properties of different child behaviors that will eventually enable us to determine mothers' elicitation thresholds.

One possible mechanism thought to explain the association between negative child behavior and mothers' negative affect is increased motivation to reduce the mother's distress (Cummings & Davies, 1994; Dix, 1991; Downey & Coyne, 1990; Kochanska et al., 1987). Bell & Chapman (1986) suggest that children with difficult behavioral characteristics elicit from parents "upper-limit" control, that is, behavior designed to reduce the child's aversiveness. When the parents' upper-limit is met by the child's behavior, there is a need for the parent to initiate controlling response in order to return to a non-aversive interaction. This may be the underlying mechanism for depressed mothers' tendencies to forcefully suppress negative child behaviors (Kochanska et al., 1987).

Depressive Symptoms, Flat Affect, and Under-Reactivity

Ironically, although higher negativity has been demonstrated repeatedly, depressive symptoms are often accompanied by another prominent change in emotionality, best described as *flat affect* (Burke, 2003; Field, 1984; Field et al., 1985, Puckering, 1989; Rottenberg, Gross & Gotlib, 2005). The capacity to react with an appropriate emotion to changing stimuli is critical for adjustment to changes in the environment (Lazarus, 1991) and seems to be affected by depression. Depressive symptoms have been associated with reduced emotional sensitivity to both happiness-inducing and sadness-inducing stimuli (Rottenberg et al. 2005). Rottenberg et al. (2005) showed that, following films and imagery, depressed individuals reported experiencing less emotional reactivity to sad conditions. Experimental studies found that depressed individuals, when compared with non-depressed participants, show less affective variation during affective picture viewing (Dichter, Tomarken, Shelton, & Sutton, 2004), less electromyography (EMG) variation during affective imagery (Gehricke & Shapiro, 2000), less sadness and amusement to sad and amusing films (Rottenberg, Kasch, Gross, & Gotlib, 2002), and blunted autonomic responding to a variety of stimuli (Dawson, Schell, & Catania, 1977). This evidence shows that responsiveness to some kinds of negative stimuli is blunted by depressive symptoms. It also raises the question, which negative stimuli cause depressed individuals to be negatively reactive and which cause them to be "flat" or non-reactive?

Consistent with these findings, depressed mothers have often been shown to express flatter affect, provide less stimulation, be less contingently responsive, and exhibit higher levels of withdrawal than non-depressed mothers (e.g., Feng, Shaw, Skuban, & Lane, 2007; Field, 1984; Field et al., 1985). Puckering (1989) described

this emotional flatness in detail, claiming that depressed mothers are "physically present but psychologically absent, unable to catch the finer cues from the child and build on these". Complementing Bell and Chapman's upper-control hypothesis (Bell & Chapman, 1986), low reactivity in depressed mothers may reflect an attempt for low effort parenting, that is, responding with behaviors that require low effort from the mother (Cummings & Davies, 1994; Downey & Coyne, 1990; Kochanska et al., 1987). This may be helpful in avoiding aversive behaviors that are below the mother's upper-limit control threshold. These behaviors, although aversive to some extent, do not alert the mother's control system, and can perhaps be terminated by simply being avoided. Another possible explanation to depressed mothers' low reactivity is that engaging in high effortful behaviors is difficult and stressful. Responding to aversive child behaviors is a demanding parental task, and may arouse and prolong maternal distress. Therefore aversive child behaviors may be better avoided in the eyes of mothers with depressive symptoms.

Consequences for Children of Depressed Mothers

In part, due to their emotional reactivity and non-reactivity, mothers' depressive symptoms are a major risk factor for children, undermining their well-being, and interfering with their cognitive, social, and emotional development (Campbell et al. 2009; Downey and Coyne, 1990; Goodman et al., 2011; Sohr-Preston & Scaramella, 2006). Past research has identified an array of children's negative outcomes that are associated with maternal depression. These include poor emotion regulation problems (Goodman & Gotlib, 1999), externalizing and internalizing

problems, and various forms of psychopathology (Cummings & Davies, 1994; Gelfand & Teti, 1990).

Having a low threshold to negative child stimuli may also have unfavorable consequences for children. The changes in parental behavior that accompany the onset of depression, such as increased negativity or unresponsiveness, have an immediate impact on children's development. This is supported by intervention studies showing that changes in parental behaviors are followed by a change in children's behavior within a few days or weeks (Patterson, 1982). Moreover, Patterson (1980) suggests that as the mother's negativity increases, the child is more likely to react with increased negativity as well. If at some point during the escalation of this negative reciprocity the child or the mother terminates the interaction by not reciprocating, the other gains a "winner" position that through a reinforcement mechanism will lead him or her to start future interactions at higher levels of negativity. Patterson found that this pattern of parental behavior tended to increase behavior problems among children who already showed some externalizing problems. Consistent with this perspective, Lindahl and Markman (1990) propose that children growing up in families that have difficulty de-escalating negative emotions may have difficulties recognizing and managing their own negative affect. From a social learning perspective (Bandura, 1977), children exposed to negative patterns of affective reactivity are thought to internalize maladaptive modes of conflict resolution, which may eventually lead them to either victimization or aggression in social situations (Schwartz, Dodge, Petit, & Bates, 1997). Indeed, mothers' over-reactive discipline had been shown to have significant negative effects on children's behavior problems (e.g., Michalcio & Solomon, 2002; O'leary, Slep, & Reid, 1999).

Under-reactive parenting has also been found to impact child behavior. Consistent with depressed mothers' flat affect, mothers' depressive symptoms have been shown to be associated with lax parenting, where mothers are less likely to follow through on discipline and more likely to give in and fail to enforce rules. Mothers with depressive symptoms have been found to exhibit decreased responsiveness (Cox, Puckering, Pound, & Mills, 1987; Goodman & Brumley, 1990), avoid confrontation, and avoid appropriate punishment (Goodman & Brumley, 1990; Kochanska et al., 1987). These parenting practices have all been reported to be associated with both internalizing problems and externalizing problems in children (Michalcio & Solomon, 2002)

Under the context of adjustment to divorce, where increases in mothers depressive symptoms are common and children's adjustment is required, we tested the following predictions: First, consistent with Lahey et al. (1984) and others, ***following a highly aversive child behavior, the probability of mothers reacting with negative affect will be higher as mothers' depressive symptoms increase.*** In addition, given depressed mothers' "flatness" and in accordance with Bell & Chapman (1986), we predict that ***at low levels of aversive child behaviors, depressive symptoms would blunt mothers' negative reactivity.*** Second, since parenting is, at least in part, reflected in mothers' affective responses to child inputs, and given extensive literature linking problematic parenting with negative child outcomes, ***mothers' patterns of under- and over-reactivity will predict children's adjustment problems.*** Third, given negative reactivity's association with depressive symptoms and children's behaviors problems, we predicted that ***mothers' affective reactivity to aversive child behavior will mediate the relation between mothers' depressive symptoms and children's***

adjustment to divorce. That is, mothers who experience depressive symptoms but who nonetheless are characterized by a relatively high threshold for negative reactivity, will have children who adjust better to their parents' divorce.

Method

Participants

Participants were 319 dyads of mothers and children from a metropolitan area in the South Central U.S., who were part of a larger longitudinal study of repartnering after divorce and its influence on child and family outcomes. Mothers' depression scores varied with 42.5% above the cutoff for mild depression, and 25.5% above the cutoff for major depression (Radloff, 1977). Given these high and varying rates of depression, this sample was well-suited for addressing our research questions. 25% of the mothers were legally divorced by the baseline assessment, and median length of separation from the spouse was 6 months (range 0-103). Boys and girls were approximately equally represented in the sample (52% female). Children's ages ranged from 4 to 9, with a mean of 7.77 (SD = 2.0). Mothers' age ranged from 21 to 53 (median age was 36.8). 64% of the mothers were Non-Hispanic White, 27% were Hispanic, and 9% were African American. Socioeconomic status varied widely. Mothers' education ranged from less than a high school degree (9.4%) to a doctoral degree (1.3%), with the median education being a 2-year associate degree. 82% of the mothers were working, at least part time, in a paid position. Prior to filing for divorce, the median family income was \$50,000 (with lower quartile being 25,000 and upper quartile being 80,000). To be eligible, mothers and children had to speak English, mothers had to have an elementary school-aged child (i.e., kindergarten through 5th grade), and children had to reside with the mother at least 50% of each week.

Design and procedures

Addresses of prospective participants were obtained from divorce court records. They were sent pamphlets containing information about the study. Phone calls were made shortly after to verify eligibility. If eligibility was confirmed, participants were asked about a possible visit to their house where they could become familiar with the study and answer questions concerning their participation. Of participants who agreed to the first visit at their house, 88% agreed to participate in the study.

Three assessments were the focus of this study. A baseline assessment was completed within 120 days of divorce filing, and two additional follow-up assessments were completed 12-months and 24-months from baseline. Additional in-home observations were recorded when significant changes in repartnering occurred (e.g., having a 3-month serious relationship, cohabitation, engagement, and remarriage). If no such changes occurred, mothers' additional assessments were obtained at 6-months and/or 18-months. Each in-home assessment included videotaping a 12-minute mother-child interaction and mothers' completing self-report questionnaires. Although some attrition occurred, 74.3% of participants in this study completed at least three assessments, 14.7 completed only two assessments, and 11% completed only the baseline assessment. Each assessment in this study included observational data and reports from mothers.

Measures

Maternal characteristics. Mothers selected one of 13 categories to characterize their education. They also reported their current annual income on a 17 category scale (1 = less than 5K per year, with 5K increments with each subsequent

category through the highest category, 8 = 80K or more). In order to represent race, ethnicity, and whether the mother was working in a paid position at least half-time, three dummy variables were created.

Mothers' depressive symptoms. We used The Center of Epidemiologic Studies Depression Scale (CES-D; Radloff, 1977) to assess mothers' level of depressive symptoms. The scale is designed for community populations, and consists of 20 items assessing depressive symptoms during the past week (e.g., "I had crying spells"; "I felt lonely"; "I felt sad"). The CES-D assesses cognitive, affective, behavioral, and somatic symptoms. Each item is rated on a 4-point scale ranging from 0 = *rarely or none of the time* (less than 1 day) to 3 = *most or all of the time* (5-7 days). A total score is calculated by summing the responses after reversing positive items. Mothers' reports on the CES-D were obtained at all assessments.

Child adjustment. Mothers reported children's behavior problems on the Behavior Problem Index (BPI; Peterson & Zill, 1986). The BPI consists of 30 items and divides behaviors into two subscales: a 16-item measure of externalizing, aggressive behavior (e.g., "he/she has a very strong temper and loses it easily"), and a 12-item measure of internalizing behavior (e.g., "he/she is withdrawn, does not get involved with others"). Two items not included in any subscales ("he/she hangs around with kids who get in trouble"; "he/she clings to adults") were used for the behavior problem total score. Mothers were asked to report on a 3-point scale whether each child behavior was 1 = *'not true'*, 2 = *'sometimes true'* or 3 = *'often true'*. A total behavior problems scale was created by summing the scores of the raw items. Cronbach's alpha for the total scale was .90, and .87 and .81 for the externalizing and

internalizing subscales, respectively. Mothers' reports on the BPI were obtained at all assessments.

Mother-child interaction task. Observational assessments of mothers and children occurred at all assessments. The observations included a structured interaction task in which the mother and the child were asked to discuss a current hot conflict (e.g., school problems, chores, behavior). The Family and Peer Process code (FPPC; Stubbs, Crosby, Forgatch, & Capaldi, 1998) was used to assess these interactions. The code consists of 24 content codes (e.g., verbal, nonverbal, vocal, physical, and compliance behaviors), and six affective codes: happy, caring, neutral, distress, aversive, and sad. Affect was coded on the basis of facial expression, voice tone, and body language, and content was coded by identifying the main themes for each talk turn. Content and affect were coded independently, and 20% of all observations were used to reach inter-rater reliability. Kappa indices of coder reliability for the occurrence of each code were .80 on average, with a 92% agreement between raters.

Child negative behaviors. In order to operationalize the negative elicitation properties of children's behaviors, the 6 possible affective codes were combined with each of the 24 content codes to generate 144 child behaviors mothers could have encountered. In order to minimize low base-rates behaviors, we calculated the median for the counts of these behaviors (median=28), and set the median as a cutoff score for including the behavior in our analyses. The median was calculated from 919 dyadic observations and 144 possible affect-content pairs. All child behaviors that occurred at frequencies below the median were removed from further analyses. This method yielded 47 child behaviors, each eliciting, to some extent, negative affect from

mothers. These 47 behaviors were then ranked from the least aversive behavior to the most aversive behavior. This rank order was purely empirical, based on conditional probabilities of all mothers in the sample reacting with negative affect to each specific child behavior $\{=P(\text{mother negative affect} | \text{negative child behavior})\}$. Figure 1 displays increases in mothers' probability of reacting with negative affect as a function of the aversiveness of child behaviors.

Mothers' negative affective reactivity. Mothers' negative affective reactivity was defined as mothers' probability of reacting with negative affect (i.e., distress or aversiveness) to an immediately preceding child behavior. In other words, these are mothers' negative affective responses conditioned on the child's behavior in his/her preceding talk turn. To operationalize mothers' negative affective reactivity to different levels of child aversive behavior, two components of mothers' negative affect were calculated: mothers' reactivity intercept and mothers' reactivity slope. An individual reactivity intercept and an individual reactivity slope were computed for each mother at each assessment point, by regressing each mother's true probability of reacting with negative affect to each child behavior on mothers' expected probability of reacting with negative affect to each child behavior (the sample's overall negative reactivity). The reactivity intercept represents mothers' reactivity to very low aversive child behavior, while the reactivity slope represents the mother's rate of increase in negative reactivity as the 47 child behaviors become increasingly aversive.

Results

Table 1 presents mothers' CES-D scores across waves, starting with a mean of 16.31 (SD=10.22) at wave 1 and moderately declining to 12.74 at wave 4 (SD=10.14). It is important to note that 16 has been extensively used as the cutoff

point for high depressive symptoms. Given that wave 1 consists of a sample of whom a divorce has been filed in the previous 120 days, this elevated level of depressive symptoms is not unexpected. Table 2 presents percentages of mothers general negativity (negativity which is not conditioned upon any input from the child), and negative reactivity (immediate reciprocated negativity). Tables 3-6 present bivariate correlations, by measurement wave, between mothers' CES-D scores and measures of mothers' negative reactivity and child adjustment. The correlation table from the final wave in this study was excluded from this paper for having only few subjects (<10).

In order to generate mothers' individual reactivity slopes and reactivity intercepts for each time point, we first calculated these two measures using a 3-level Hierarchical Linear Model (HLM). At level-1 this model included mothers' observed reactivity within time and across behavior. At level-2 the model included observed reactivity within mothers' and across time. At level-3 we used a set of between-subject variables. Next, these data were used to model the average and linear trajectories of mothers' negative reactivity to negative child behaviors as a function of mothers' level of depressive symptoms. A second set of analyses using HLM was conducted to examine our hypotheses. It is important to note, first, that associations of control variables (e.g., child sex and age, mother's age) with mothers' reactivity intercepts and slopes were non-significant, and so were excluded from the final models. We began by testing our hypothesis that *following a highly aversive child behavior, the probability of mothers to react with negative affect will be higher as mothers' depressive symptoms increase, but at low levels of aversive child behaviors, depressive symptoms would blunt mothers' negative reactivity*. Results are presented in table 7. Participant-level predictor was mothers' CES-D scores, and

was found to have a significant effect on mothers' reactivity intercept ($\beta = -.009, p < .01$). As mothers' depressive symptoms increased, they were less likely to exhibit negative reactivity at low levels of child aversiveness. In addition, CES-D significantly predicted mothers' reactivity slope ($\beta = .973, p < .01$), indicating that as mothers' depressive symptoms increase, they exhibit steeper increases in negative reactivity as child behaviors become increasingly negative.

We then examined whether *mothers' patterns of under- and over-reactivity predict children's adjustment problems*. Participant-level predictors were mothers' reactivity intercept and mothers' reactivity slope. As presented in table 8, both predictors had significant effects on children's adjustment problems. Increases in mothers' reactivity intercept were associated with increases in children's internalizing problems ($\beta = 6.80, p < .01$), externalizing problems ($\beta = 9.78, p < .05$), and total behavior problems ($\beta = 8.62, p < .01$). Similarly, increases in mothers' reactivity slope were associated with increases in children's internalizing problems ($\beta = .06, p < .01$), externalizing problems ($\beta = .09, p < .05$), and total behavior problems ($\beta = .08, p < .05$).

Finally, in order to test whether *mothers' affective reactivity to aversive child behaviors mediates the relation between mothers' depressive symptoms and children's adjustment* we conducted a multilevel mediation analyses, based on the principles of Zhang, Zyphur, and Preacher (2009). Specifically, because our hypothesized mediating variables (mothers' reactivity intercept and mothers' reactivity slope) are both positively associated with children's adjustment problems, but only mothers' reactivity slope is positively associated with mothers' depressive symptoms, we conducted a single mediation analyses solely for mothers' reactivity slope.

Coefficients from the two final equations for each variable predicted are shown in equations 1.1, 1.2.

Equation 1.1

$$Y_{\text{Reactivity Slope}} = .37 + .023 * \text{CES-D}$$

Equation 1.2

$$Y_{\text{Behavior Problems}} = 1.29 + .007 * \text{ReactivitySlope} + .009 * \text{CES-D}$$

In equation 1.1, initial status' coefficient was $\beta = .37$ ($SE = .07$, $p < .01$) and the coefficient for CES-D was $\beta = .023$ ($SE = .004$, $p < .001$). However, as shown in equation 2.2, initial status' coefficient was $\beta = 1.29$ ($SE = .07$, $p < .01$), but the coefficient for reactivity slope was $\beta = .007$ ($SE = .03$, n.s.). The coefficient for CES-D was $\beta = .009$ ($SE = .004$, $p < .05$). Given the nonsignificant coefficient for the reactivity slope, evidence for mediation has not been found.

Discussion

The purpose of this study was to investigate the mechanism by which depressive symptoms regulate mothers' emotional expression in response to children's aversive behaviors. Patterns of over-reactivity at high levels of child aversiveness and under-reactivity at low levels of child aversiveness were hypothesized to reflect mothers' attempts to minimize parental distress and predict children's behavior problems. Results demonstrate that mothers' affective responses to aversive child inputs depend on the level of aversiveness of children's behavior. At low levels of aversive child behaviors, depressive symptoms predicted less affective reactivity from

mothers. As children's behaviors became increasingly aversive, depressive symptoms predicted steeper increases in mothers' negative reactivity, resulting in significantly higher negative reactivity for mothers with depressive symptoms relative to mothers without depressive symptoms. In addition, both mothers' depressive symptoms and mothers' patterns of affective reactivity predicted child behavior problems. These results highlight the role of depressive symptoms and child aversiveness in regulating mothers' expression of affect, thus revealing a possible mechanism by which depressive symptoms undermine parenting.

Predicting Mothers' Expression of Emotion

Consistent with our hypothesis, mothers with depressive symptoms were less negatively reactive, or more flat, when child inputs were low in aversiveness. As some studies have shown (e.g., Downey & Coyne, 1990; Feng et al., 2007), mothers with depressive symptoms can sometimes be flat and unresponsive, and not always exhibit negative over-reactivity. Yet, whereas previous studies examined overall relations among static levels of mothers' and children's negativity, often across relatively lengthy interactions, the present study used a micro-level analytic method that allowed us to examine changes in mothers' contingent affective reactivity to child behavior on a moment-to-moment basis. Our findings show that, on the spectrum of child aversiveness, mothers' flat affect was only occurring when children engaged in relatively low aversive behaviors. This is consistent with the proposal that depressive symptoms increase mothers' motivation to reduce distress. By not reciprocating low aversive behaviors, mothers with depressive symptoms may avoid aversive cycles that increase their distress and eventually escalate into an even more negative interaction. Since parenting is highly demanding, depressive symptoms may lead to low-effort

behaviors in mothers. It has been suggested that, to be effective, parents must maintain optimal levels of emotion in the socialization context (Dix, 1991; Eisenberg, Cumberland, & Spinrad, 1998). Mothers with depressive symptoms may have difficulty maintaining emotions at these levels. Mothers with depressive symptoms may be selective about the type of child behaviors to which they choose to react. If a low-aversive child behavior does not have an immediate, notable, negative impact, mothers with depressive symptoms may prefer to minimize their difficulty and distress by not reacting against it. Therefore, as depressive symptoms increase, expression of affect may be suppressed when the consequences of not responding are less aversive than the consequences of responding.

Mothers with depressive symptoms were more negatively reactive when child inputs were highly aversive. As children's behaviors became increasingly aversive, mothers' depressive symptoms predicted particularly rapid increases in negative reactivity. This finding supports Lahey's et al. (1984) proposal that mothers who are in distress have lower thresholds for the activation of negative emotion. They react more harshly to their child at relatively lower levels of aversiveness than do non-depressed mothers. As with low negative reactivity, high negative reactivity may be a strategy mothers with depressive symptoms use to reduce distress. By reacting negatively, these mothers may seek to suppress immediately child behaviors that contribute to their distress. Since distress shifts priorities toward immediate reduction of aversive inputs (Tice, Bratslavsky, & Baumeister, 2001), it may lead to short-term, self-focused control, at the expense of patient socialization and child-oriented parenting.

Alternatively, these findings may reflect emotion regulation deficits or difficulty inhibiting negative emotion. When observational methods are used, it is difficult to infer whether an expression of negative affect reflects the intensity of a mother's expression of emotion or her facility at regulating it (Cole, Martin, & Dennis, 2004). In this study, we have presumed that a mother who has difficulty managing her negative emotions in the face of an aversive child behavior is displaying negative reactivity. However, this mother could also be viewed as having difficulties regulating her emotions. Another possibility is that mothers with depressive symptoms exhibit intense negative reactivity due to the more intense negative emotions they experience. Because these mothers experience greater distress, regulating it may be particularly difficult for them.

Last, it is possible that the blunted vs. heightened negative reactivity mothers with depressive symptoms express reflects an attention deficit problem. When child aversiveness is low, mothers with depressive symptoms may fail to encode these behaviors as negative, therefore not reacting to them. Since depressive symptoms interfere with the ability to select and maintain appropriate focus (Dix & Meunier, 2009), mothers with depressive symptoms may have difficulty picking up subtle aversive cues from their child and reacting with an appropriate emotion. On the other hand, when child aversiveness is high, the affective system of mothers with depressive symptoms is more easily alerted, thus activates mothers' negative emotion.

Predicting Child Outcomes

Our findings indicate that children's internalizing and externalizing behaviors are predicted by mothers' affective reactivity. Mothers who are more likely to respond to their children's highly aversive behaviors with negative affect have children who

have more behavior problems. Mothers who are more likely to respond when their child's behavior is relatively low in aversiveness also have children with more behavior problems. Mothers' patterns of negative reactivity significantly predicted children's behavior problems. At a broad level, the findings suggest that mothers' over-reactivity may be harmful for children's adjustment. This is in line with past research showing that parents' emotional responses to their children's aversiveness influence children's subsequent awareness and regulation of emotional arousal, their emerging social skills and behavior problems (e.g., Eisenberg et al., 1998; Schultz, Izard, Ackerman, & Youngstrom, 2001). Family environments that are rejecting, punishing, or dismissing of a child's aversiveness interfere with adaptive emotional development and functioning (Gottman, Katz, & Hooven, 1997; Shipman & Zeman, 2001).

A variety of processes may account for these relations. One explanation is that maternal negative reactivity elicits children's resistance and negative affect, leading to coercive family interactions and poor emotion regulation. To successfully maintain cooperative social interaction requires that mothers' arousal or negative affect be maintained at an optimal level (e.g., Eisenberg et al., 1998). The reactions of parents can escalate or de-escalate children's arousal as the interaction proceeds. Mothers who react to aversive child behaviors with negative affect can escalate the levels of negative affect experienced by their children. This is in line with Tronick's (1989) idea that the affective communication of the mother changes the emotional experience and behavior of the child. When a child experiences negative emotion, the parent has a key role in reducing the child's negative emotion and promoting the child's positive emotion (Gianino & Tronick, 1988). When parents accentuate rather than reduce

children's negative emotions, children may fail to develop emotion regulation skills. This may occur when children's emotional experiences are not accepted as legitimate and are met with inappropriate, punitive, or rejecting parental responses. This is supported by research showing that individuals who are punished for the expression of a negative emotion often learn to suppress their expression of the emotion, but paradoxically experience heightened negative reactivity in emotional contexts (Gross & Levenson, 1993; Lynch, Robins, Morse, & Krause, 2001)

Alternatively, these findings may reflect a more cognitively driven process. Mothers' negative reactivity may teach children a set of cognitive processes. Children whose aversive behaviors are responded to with negativity may learn to expect negative reactions from others and respond with negative affect as well. This pattern of reacting negatively may then generalize to interactions with others. Less socially skilled children may develop expectations about interactions with others based on their experiences with their mother and expect their aversiveness to be responded to negatively, which, in turn, may condition how they react to the aversive behaviors of others (Dodge, 1986). Dodge and Frame (1982) suggest that negative behaviors elicit negative reactions from others that serve to maintain patterns of maladaptive behaviors.

Last, from a behavioral standpoint, it is possible that by reacting negatively, mothers teach children to escalate conflicts. Patterson (1982) proposed that through reinforcement, mothers' negative reactivity teaches children that the way to "win" a conflict is by reciprocating negativity. As the mother's negativity increases, the child is more likely to follow it with increased negativity as well. If at some point one terminates the interaction by not reciprocating, the other gains a "winner" position and

thus reinforced for being negative. This will lead him or her to start future interactions at higher levels of negativity. In this study, children of negatively reactive mothers can learn to escalate negativity, and this escalation plays a key role in the emergence of externalizing behavior. Another explanation involves observational learning (Bandura, 1989). Children who observe maternal negative affect in response to their own negative behavior may learn through modeling to continue this pattern in future social interactions. A final possible explanation is that children who experience negative reactivity in response to their behavior may become less positive about interacting with others, and thus may avoid social contact. The tendency to avoid interactions with peers and adults may lead to a less developmentally stimulating social environment, which is the basis for children's internalizing problems.

Withdrawn children are often unable to form good peer relationships, are often negative with peers, and are at risk for developing internalizing problems (Hogue & Steinberg, 1995; Oland & Shaw, 2005). Furthermore, children who exhibit high internalizing problems remain distant from peers and are more likely to engage in isolative behaviors and social withdrawal (Coie & Dodge, 1998). The possibility that mothers' negative reactivity may cause children's internalizing problems due to emerging avoidance behavior is supported by Carson and Parke (1996), who found that teachers rated children with negatively reciprocating parents as being more likely to avoid others.

Mothers' affective reactivity did not clearly mediate the relation between mothers' depressive symptoms and child behavior problems. It is possible that this is due to our measuring only one component of the complex dynamics of depressive parenting. Children's adjustment involves, and can be affected by, numerous aspects

of parenting related to mothers' depressive symptoms. These include negative perceptions of children (e.g., Brody & Forehand, 1986), tendencies to be self-oriented rather than child-oriented (e.g., Dix & Meunier, 2009), unrealistic expectations of children (e.g., Azar, Robinson, Hekimian, & Twentyman, 1984), and lack of motivation to engage in the interaction. These and other processes may work in consort with mothers' affective reactivity to determine children's behavior problems. Affect does not have a single behavioral result, and until we include other aspects of parenting, we may not be able to fully see the complexities of depressed mothers' affective system. It is possible, for example, that if we measured mothers' negative reactivity while controlling for maternal warmth, sensitivity, and empathy, we would have been able to capture negative reactivity with reduced noise and get more accurate estimates. In addition, depressed mothers' affect can lead to diverse forms of parenting, such as harshness, intrusiveness, and even withdrawal (e.g., Cohn, Matias, Tronick, Connell, & Lyons-Ruth, 1986; Field, Healy, Goldstein, & Guthertz, 1990). These were not tested here along with affect for each individual mother, therefore preventing us from controlling for such maternal characteristics.

Limitations

There are important limitations to the current study that future research needs to address. First, the use of a community-based, non-clinical sample limits the ability to generalize results to clinical populations. Second, the mother-child interaction task used in this study yielded low frequencies of negative affect from mothers. It would be helpful for future research to include more emotion-arousing, interactions, especially those that tap parenting difficulties (e.g., discipline, affection, competence, and emotional control). Third, we did not measure intensity of mothers' negative

emotions, but only their frequency. Specifying the intensity of emotion can allow examining linear trends of reactivity at different levels of emotion intensity and conducting more advanced analyses.

Conclusion

The present study has taken a step forward in trying to disentangle the relation between two prominent and seemingly contradicting affective states, *negative over-reactivity* and *negative under-reactivity*, to mothers' depressive symptoms and children's behavior problems. Findings supported our hypotheses that when the aversiveness of child behavior is low, depressive symptoms predict low negative reactivity, and as children's aversiveness increases, depressive symptoms predict high negative reactivity.

In addition, mothers' affective reactivity to children's aversive behaviors seemed to be a critical psychological construct to explain children's behavior problems. The associations between children's behavior problems and mothers' negative reactivity over a two-year period imply that children's risk for behavior problems appears to be proportional to the chronicity and severity of mothers' tendencies for negative reactivity during mother-child interactions. Even relatively short periods characterized by increased maternal negative reactivity appear to be associated with children's behavior problems.

Appendix

Figure 1:
Sample reactivity as a function of the level of negative child behavior

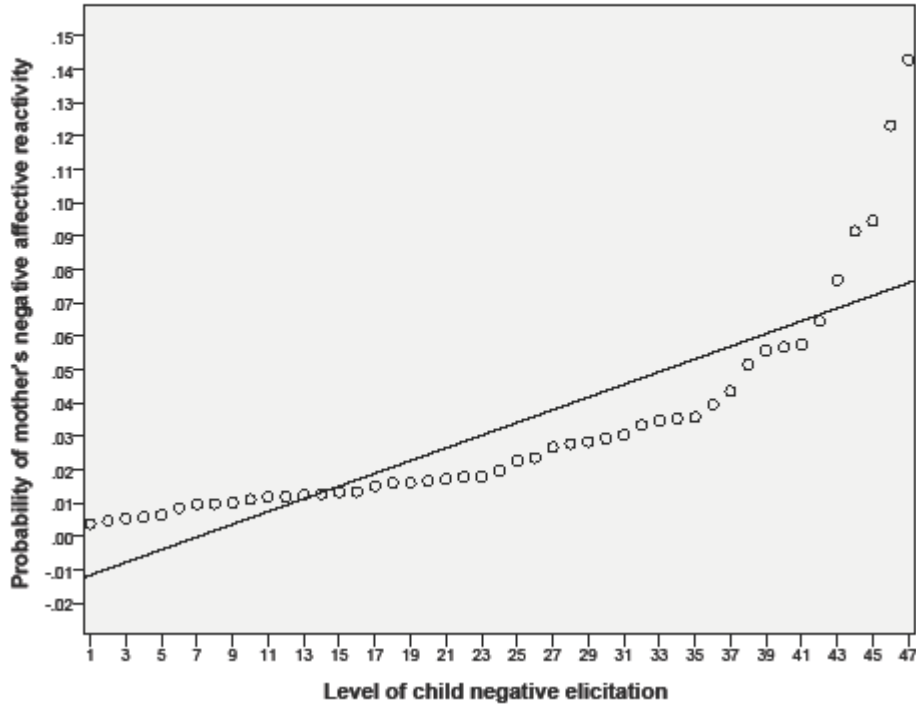


Table 1: Descriptive statistics for mothers' reports on the CES-D by wave

wave	N	Mean	Median	Std. Deviation	Minimum	Maximum
.00	318	16.3191	14.7368	10.22710	.00	52.63
1.00	227	14.2546	12.6316	10.21581	.00	49.47
2.00	235	12.3046	10.5263	9.68144	.00	44.21
3.00	230	14.3936	11.5789	11.31723	.00	53.68
4.00	270	12.7486	9.4737	10.14214	.00	47.37
5.00	1	7.3700	7.3700	.	7.37	7.37
Total	1281	14.1115	12.6316	10.40442	.00	53.68

Table 2: percentages of overall children's and mothers' negativity during interactions

	Percentage of talk turns
Mothers' negative talk turns	1.4
Mother is negative in response to child negativity	7.8

Tables 3-6 : Correlations between CES-D, mothers' affective negative reactivity and child behavior problems by wave.

wave 0	1	2	3	4	5	6	7	8
1. CES-D	1							
2. Mothers' affective reactivity to negative child behaviors	.10	1						
3. Percent of mothers' negative talk turns	.02	.19**	1					
4. Reactivity intercept	-.11	-.57**	-.09	1				
5. Reactivity slope	.17**	.70**	.14**	-.92**	1			
6. Internalizing problems	.26**	-.09	-.11*	.11	-.06	1		
7. Externalizing problems	.19**	.01	.10	.12*	-.06	.65**	1	
8. Total behavior problems	.25**	-.03	.01	.12*	-.06	.87**	.94**	1

$p < .05$; * $p < .01$; **

wave 2	1	2	3	4	5	6	7	8
1. CES-D	1							
2. Mothers' affective reactivity to negative child behaviors	.09	1						
3. Percent of mothers' negative talk turns	.08	.21**	1					
4. Reactivity intercept	-.06	-.70**	-.18**	1				
5. Reactivity slope	.14**	.76**	.31**	-.93**	1			
6. Internalizing problems	.38**	.21**	.15*	-.09	.15*	1		
7. Externalizing problems	.27**	.15**	.23**	-.05	.10	.66**	1	
8. Total behavior problems	.34**	.19**	.22**	-.07	.13*	.86**	.95**	1

wave 4	1	2	3	4	5	6	7	8
1. CES-D	1							
2. Mothers' affective reactivity to negative child behaviors	.18**	1						
3. Percent of mothers' negative talk turns	.09	.45**	1					
4. Reactivity intercept	-.11	-.51**	-.11	1				
5. Reactivity slope	.18**	.64**	.24**	-.94**	1			
6. Internalizing problems	.34**	.18**	.16*	-.14*	.17**	1		
7. Externalizing problems	.32**	.15*	.19**	-.14*	.19**	.68**	1	
8. Total behavior problems	.36**	.18**	.20**	-.15*	.20**	.88**	.94**	1

$p < .05$; * $p < .01$; **

$p < .05$; * $p < .01$; **

wave 5	1	2	3	4	5	6	7	8
1. CES-D	1							
2. Mothers' affective reactivity to negative child behaviors	-.01	1						
3. Percent of mothers' negative talk turns	-.15	.22	1					
4. Reactivity intercept	-.05	-.40**	-.17	1				
5. Reactivity slope	.06	.48**	.25*	-.94**	1			
6. Internalizing problems	.49**	.45**	-.06	-.19	-.04	1		
7. Externalizing problems	.41*	.51**	-.03	-.02	.11	.76**	1	
8. Total behavior problems	.46**	.51**	-.04	.06	.06	.89**	.97**	1

Table 7: Longitudinal Multilevel Models for CES-D Predicting Observed Maternal Reactivity

	<i>Maternal Reactivity Intercept</i>	<i>Maternal Reactivity Slope</i>
Fixed effects		
Initial status, β_{00}	.000 (.000)	.002 (.048)
Maternal CES-D, β_{10}	-.009** (.003)	.973** (.304)
Random Effects		
	<i>Variance Component</i>	<i>Variance Component</i>
Level-1, e	.0002	1.795
Level-2: initial status, r_0	.0000	.034
Level-2: CES-D, r_1	.0002	1.779

Table 8: Longitudinal Multilevel Models for Mothers' Reactivity Intercept and Slope Predicting Child Adjustment.

	<i>Internalizing problems</i>	<i>Externalizing problems</i>	<i>Total behavior problems</i>
Fixed Effects			
Initial status, β_{00}	1.32** (0.014)	1.51** (0.02)	1.43** (0.01)
Reactivity Intercept, β_{10}	6.80** (2.77)	9.78 ** (3.37)	8.62** (2.88)
Reactivity Slope, β_{20}	.06** (0.02)	.09** (0.03)	.08** (0.02)
Random Effects			
	<i>Variance Component</i>	<i>Variance Component</i>	<i>Variance Component</i>
Level-1, e	.03	.03	.06
Level-2: initial status, r_0	.05	.08	.02

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