

Maternal Depression and Child Internalizing: The Moderating Role of Child Emotion Regulation

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This study tests a model of children's emotion regulation (ER) as a moderator of the link between maternal depression and child internalizing problems. Participants were 78 children (ages 4 to 7), including 45 children of mothers with a history of childhood-onset depression (COD) and 33 children of mothers who had never been depressed. ER was assessed observationally during a laboratory mood induction. ER behaviors were empirically reduced into 3 categories: (a) negative focus on delay, (b) positive reward anticipation, and (c) behavioral distraction. Linear mixed models indicated that positive reward anticipation moderated the effects of maternal COD on children's internalizing problems, particularly if mothers had current depressive symptoms. Findings suggest that generating positive affect in the face of a potential frustration may be a protective ER strategy for children at risk for depression.

Offspring of depressed parents are known to be at increased risk for depression and other psychiatric and psychosocial problems compared to the general population (Beardslee, Bemporad, Keller, & Klerman, 1983). Children of depressed parents are at a three- to fourfold risk for developing depression prior to adulthood (Beardslee, Versage, & Gladstone, 1998; Weissman, Warner, Wickramaratne, Moreau, & Olfson, 1997), with up to 45% having an episode of major depression by late adolescence (Beardslee et al., 1998; Hammen, 2000). However, even within this high-risk population, many children remain free of psychopathology (Weissman et al., 1997). During the last two decades, a growing number of researchers have applied a transactional perspective to the study of vulnerability

and resiliency among high-risk populations. A transactional perspective highlights the ongoing reciprocal interplay between social, biological, and psychological characteristics (Sameroff & MacKenzie, 2003). According to such a perspective, reciprocal transactions among caregiver and child characteristics act dynamically to increase or decrease the likelihood that a child will develop depression or other psychological disturbances (Cicchetti & Toth, 1998). One important child characteristic that could promote resiliency or exacerbate risk in the context of maternal depression is the ability to adaptively regulate emotions.

Emotion regulation (ER) is defined as the internal and external processes involved in the initiation, maintenance, or modification of the quality, intensity, or chronometry of affective responses (Forbes & Dahl, in press). ER is a complex construct, and factors involved in initiating versus regulating an emotion are closely intertwined (e.g., Campos, Frankel, & Camras, 2004; Cole, Martin, & Dennis, 2004). The literature suggests that a wide variety of responses can serve emotion regulatory goals in childhood, such as seeking physical comfort from a caregiver, refocusing attention away from the source of distress, or taking direct action to re-

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solve a problem (Calkins, Gill, Johnson, & Smith, 1999; Grolnick, Bridges, & Connell, 1996). ER may be a particularly important factor in understanding risk for internalizing problems, which are characterized by affective dysregulation involving sadness, fear, or joy.

One of the most common scenarios requiring ER for children is the demand to wait for a desired object or goal, especially when there is little else of interest in the environment. Examples include having to wait for a parent to get off the phone or attend to another child, for school to end, or for a favorite snack or toy. For a young child, waiting even a few minutes without attaining a desired goal can provoke negative emotions. Children may respond under such circumstances with adaptive strategies that serve to down-regulate levels of negative affect or with maladaptive ER strategies that maintain or even increase levels of negative affect.

Beginning in infancy, children utilize rudimentary behaviors to regulate emotional experience. These behaviors become increasingly sophisticated as children develop more complex cognitive and emotional skills (Kopp, 1989). Grolnick et al. (1996) outlined a set of behaviors for regulating emotion that are commonly used by preschool-age children. The first set of strategies includes behaviors aimed at shifting attention from a distressing stimulus toward a nondistressing stimulus (Derryberry & Rothbart, 1988). Observational studies of infants and young children show that attention shifting, or refocusing attention on a nondistressing stimulus, is generally an effective strategy that has been associated with lower levels of subsequent distress (Buss & Goldsmith, 1998; Calkins & Johnson, 1998; Grolnick et al., 1996). Greater use of distraction and attention shifting has also been associated with lower concurrent and future externalizing behaviors in young children (Eisenberg et al., 2000; Gilliom, Shaw, Beck, Schonberg, & Lukon, 2002; Valiente et al., 2003). Few researchers, however, have examined how attention shifting relates to children's internalizing problems.

A second set of ER strategies described by Grolnick et al. (1996) includes comfort behaviors such as self-soothing or seeking physical comfort from a caregiver. Infants' levels of proximity seeking to parents is viewed as one of the most critical factors in determining attachment security during distress paradigms such as the Strange Situation (Gaensbauer, 1985). Grolnick et al. also suggested that verbal behaviors may be used as a form of comfort seeking. Verbalizations such as "I can do it" or "I'm a big kid now" might serve as a primitive form of cognitive restructuring. Little is known, however, about how comfort-seeking strategies used by young children are associated with adjustment.

A third set of behaviors used by young children involves maintaining or increasing attentional focus on a distressing stimulus. A growing body of literature suggests that this is a maladaptive approach to regulating

negative emotion. Research with infants and toddlers has shown that sustained focus on a frustrating stimulus, such as searching for the mother during a separation or staring at a delayed prize, is associated with anger and distress (Gaensbauer, Connell, & Schulz, 1983; Gilliom et al., 2002; Grolnick et al., 1996). Mischel and Ebbesen's (1970) classic work on delay of gratification revealed that enhanced attentional focus on a delayed reward was associated with decreased ability to wait for the reward. Sustained focus on delay or distress also appears to be a risk factor for externalizing problems (Calkins et al., 1999; Gilliom et al., 2002). Although little research has addressed links between sustained focus on distress and internalizing problems in young children, research has been conducted with older children on the relevant constructs of rumination (Nolen-Hoeksema, 1994) and involuntary control coping (Compas, Connor-Smith, Saltzman, Thomsen, & Wadsworth, 2001). Findings from these studies show that, for older children and adolescents, sustained focus on the source of distress is associated with increased sad mood and internalizing problems (Compas et al., 2001; Nolen-Hoeksema, 1994; Silk, Steinberg, & Morris, 2003).

Another set of behaviors for regulating emotion rarely examined in young children involves mobilizing positive emotions. The recent focus on positive psychology (Fredrickson & Joiner, 2002; Seligman & Csikszentmihalyi, 2000) has highlighted the need to consider the generation and regulation of positive emotions as a central aspect of an individual's emotion-regulatory competence. As Frederickson and Joiner noted, the generation of positive affect can be self-enhancing, leading to upward spirals in mood and behavior. The regulation and generation of positive emotions, however, has received strikingly little attention in children. Potentially important aspects of children's regulation of positive emotions during a frustrating delay include (a) the ability to generate and maintain positive affect as a strategy for modulating negative affect and (b) the mobilization of appetitive motivational systems to anticipate the rewarding aspects of the delay object. In the first case, children use positive affect to regulate negative affect. In the second case, children generate positive affect for its own sake in the service of reward-related goals.

Emerging evidence from studies of adults suggests that the up-regulation of positive emotions during negative or stressful experiences is an important and adaptive skill for managing emotion (Diamond & Aspinwall, 2003). For example, the use of cognitive processes to generate positively valenced thoughts, to positively reappraise a situation, or to find positive meaning in a negative situation are associated with greater psychological resilience (Garnefski, Teerds, Kraaij, Legerstee, & van den Kommer, 2004; Tugade & Fredrickson, 2004).

Positive affect also plays an important role in seeking and responding to rewarding stimuli (Rolls, 1999; Schultz, 2000). Problems with the mobilization and regulation of positive affect during a reward may be especially important for children of depressed parents given emerging links between depression and appetitive systems (Depue & Iacono, 1989; Forbes & Dahl, in press; Fowles, 1980; Gray, 1990). Children at risk for depression may show low levels of motivation to seek out or obtain rewarding experiences (Forbes, Shaw, & Dahl, XXXX).

Relatively little is known; however, about how children of depressed parents self-regulate their emotions. Some evidence suggests that such children have a limited repertoire of ER strategies and that they utilize strategies that are considered to be less effective compared to children of never-depressed (NCOD) mothers (Garber, Braafladt, & Zeman, 1991; Silk, Shaw, Skuban, Oland, & Kovacs, in press). There are several reasons why children of depressed parents may show suboptimal emotion-regulatory responses. One reason is that ER strategies are learned and shaped during development within the context of child-caregiver interactions (Eisenberg, Cumberland, & Spinrad, 1998), which have been shown to be disturbed when mothers are depressed (Goodman & Gotlib, 1999). Another reason is that children may directly model dysfunctional parental ER strategies. This is particularly likely if parents have had childhood-onset depression (COD), resulting in a disruption of the parents' own development of ER competence.

We argue that those children of depressed parents who exhibit suboptimal ER responses may be at particularly high risk for internalizing problems. Children of depressed parents have been found to be exposed to high levels of negative affect in the family environment (Downey & Coyne, 1990). These children may not have the skills to adaptively regulate arousal associated with exposure to family conflict. However, a child who is adept at down-regulating negative affect may be able to maintain a sense of emotional stability within the context of an emotionally arousing family environment (e.g., Morris et al., 2002). In addition, children who are able to anticipate, seek out, or up-regulate positive affect, even in an environment potentially characterized by low levels of reward or positive emotion, may also be less vulnerable to developing internalizing problems.

This Study

This study uses observational methods to examine whether strategies children use to regulate emotion play a role in moderating the relation between maternal depression and early internalizing problems. We focus on children in preschool and early elementary school

because this is a period of increasing demand for ER skills, as well as a period of increasing acquisition of skills for regulating emotion in normally developing children. The study focuses on ER during a laboratory reward-delay paradigm in children of mothers with a history of COD and children of NCOD mothers. In this paradigm, children are told that they will receive a prize (a cookie or toy) and the prize is given to the child's mother and kept in plain view but out of the child's reach. The child is asked to wait for the prize in a room devoid of fun toys or activities. This paradigm challenges a broad set of self-regulatory skills, including inhibitory control, as well as the ability to regulate anger, sadness, or frustration associated with having to wait for the prize. The study focuses on three ER responses observed in children's reaction to this task: (a) sustaining a negative focus on the desired object or waiting situation, (b) use of behavioral distraction to redirect attention away from the waiting situation, and (c) maintaining, or up-regulating, positive affect in anticipation of receiving the desired object.

We hypothesized that the relation between maternal diagnostic status and child internalizing problems would be moderated by specific regulation strategies children utilize. First, we hypothesized that the highest levels of internalizing problems would be demonstrated for children of COD mothers who sustain focused attention on the delay object or situation. Second, we hypothesized that lower levels of internalizing problems would be demonstrated for children of COD mothers who show higher levels of behavioral distraction or higher levels of positive affect in anticipation of reward.

Method

Participants

Seventy-eight children (44 boys, 34 girls) participated in this study with their mothers. Forty-five children were offspring of mothers with a history of COD, and 33 children were offspring of NCOD mothers. Mothers and children were participants in a larger Program Project on risk factors for childhood-onset mood disorder. For inclusion in the larger study, all COD mothers were required to meet *Diagnostic and Statistical Manual of Mental Disorders* (3rd ed. [DSM-III]; American Psychiatric Association, 1980; or 4th ed. [DSM-IV]; American Psychiatric Association, 1994) criteria for major depressive or dysthymic disorder ($n = 27$) by age 14 or bipolar spectrum disorder (Bipolar I, Bipolar II, or cyclothymic disorder) by age 17 ($n = 9$). All NCOD mothers reported a lifetime history free of major psychiatric disorders. All participants were free of preexisting major systemic medical disorders and were without evidence of mental retardation.

Children ranged in age from 4 to 7 ($M = 5.00$, $SD = 1.16$) and mothers ranged in age from 21 to 39 ($M = 28.87$, $SD = 4.69$). Eight pairs of siblings from the COD group and one pair of siblings from the NCOD group participated in the study together. As shown in Table 1, COD and NCOD groups did not differ in race, marital status, mother's education, family income, child age, or child gender. COD mothers were, however, younger on average than NCOD mothers. Mother's age was not related to child ER or internalizing problems; therefore, this was not included as a covariate in subsequent analyses.

Recruitment and Diagnoses

COD mothers were recruited via (a) accessing individuals who had participated in a follow-up study of childhood depression (Kovacs, Obrosky, Gatsonis, & Richards, 1997; $n = 11$) and (b) advertising in the general community ($n = 26$). NCOD participants were recruited by (a) using the Cole Directory, which provides phone numbers for families meeting specific socio-demographic criteria ($n = 7$), (b) advertising for volunteers in the general community ($n = 15$), and (c) advertising through a local Women, Infants, and Children Center, a program that provides nutritional services for

income-eligible families with young children ($n = 10$). There were no significant differences across recruitment sources on demographic variables, with the exception that NCOD mothers from the community were older than NCOD mothers recruited from research studies, $F(2, 31) = 5.71$, $p < .01$. There were no significant differences across recruitment sources in maternal depressive symptoms on the Beck Depression Inventory (BDI; Beck, Rush, Shaw, & Emery, 1979).

Diagnostic status of each mother was determined based on the results of standardized, semistructured psychiatric interviews, administered by professional-level clinical evaluators. For participants from the Kovacs et al. (1997) study of COD, original diagnoses were made during childhood and were confirmed via follow-up interviews. For participants recruited as adults from the community, diagnoses were made retrospectively, based on detailed information about childhood functioning. Interviews were conducted with the mother and, separately, with a second informant knowledgeable about the mother's childhood (e.g., the mother's parent or sibling). In addition, childhood psychiatric records were required to establish documented evidence of the mood disorder during childhood (e.g., notes in medical records or childhood psychiatric evaluations). Two senior psychiatrists independently reviewed the assessment results and supporting records and arrived at a final *DSM*-based consensus diagnoses.

Table 1. Demographic Characteristics of Participants

Variable	NCOD ^a	COD ^b	t/χ^2
Mother's Age			
<i>M</i>	30.64	27.58	2.99**
<i>SD</i>	5.25	3.79	
Mother's Marital Status			1.85
Married	24	26	
Single	9	19	
Mother's Education			5.42
Less than 12th grade	3	7	
High school graduate/GED	11	19	
Some college	16	16	
College Graduate	3	3	
Income per year	\$22,860	\$22,002	0.21
Mother's Race			3.92
European American	21	32	
African American	9	10	
Asian	1	0	
Biracial	2	1	
Other	0	2	
Mother's BDI Score			
<i>M</i>	3.42	12.49	-5.05***
<i>SD</i>	3.84	9.77	
Child's Age			
<i>M</i>	5.12	4.91	0.79
<i>SD</i>	1.19	1.15	

Note: NCOD = never-depressed mothers; COD = mothers with childhood-onset depression; BDI = Beck Depression Inventory. Because siblings visited the laboratory on different days, mothers' demographic data is included for each appropriate date of visit for each child.

^a $n = 33$. ^b $n = 45$.

* $p < .05$. ** $p < .01$. *** $p < .001$.

Procedures

This study included mothers who met the previously described criteria for the larger study and who had children ages 1 to 12 years old. Families visited the laboratory around the time of the child's birthday annually during the course of 4 years or until they reached the age of 12. Mothers provided signed informed consent for their participation and their child's participation in the study at the beginning of each visit. Participants completed a 2- to 2.5-hr laboratory visit that was video-recorded through a one-way mirror. All visits began with the child playing with toys on his or her own while the mother completed questionnaires, followed by a series of age-appropriate structured tasks.

This report focuses on observational data from a delay task completed when children were ages 4, 5, or 7. During the task, children were required to wait for a cookie (age 4) or toy (age 5 and 7). The laboratory was cleared of fun toys and the mother was asked to sit at a table and complete questionnaires. The mother was given a bag with a cookie or toy inside and asked to keep it within the child's view but out of his or her reach for 3 (age 4) or 7 (ages 5 and 7) min. At the end of the task, the examiner signaled the mother to give the cookie or toy to the child.

Different versions of this delay task have been used successfully to elicit negative emotion and parental re-

sponse to emotion in children of this age range and have been shown to be associated with later problem behavior and social competence (Gilliom et al., 2002; Martin, 1981). The delay task is successful at eliciting mildly elevated levels of negative affect in children compared to a neutral task (Silk et al., in press).

Measures

Follow-Up Interview Schedule for Adults. COD probands recruited from the follow-up study of childhood depression (Kovacs et al., 1997) were assessed via the Follow-Up Interview Schedule for Adults, a semistructured psychiatric interview for adults adapted from the Interview Schedule for Children and Adolescents (Sherrill & Kovacs, 2000). Diagnoses were derived based on symptom ratings and assigned by consensus among the interviewers according to *DSM-III* criteria. Interrater reliabilities were satisfactory, with a mean intraclass correlation of .89 for psychiatric symptoms.

Structured Clinical Interview for *DSM-IV* Patient Version. The Structured Clinical Interview for *DSM-IV* Axis I Disorders, Patient Edition (First, Spitzer, Gibbon, & Williams, 1995) was used to assess lifetime psychiatric disorders among prospectively recruited COD probands and NCOD probands. This measure is a semistructured, clinician-administered diagnostic interview that includes modules corresponding to major *DSM* psychiatric classes. The Structured Clinical Interview for *DSM-IV* Axis I Disorders was expanded to include criteria for selected childhood diagnoses and *DSM-III* (American Psychiatric Association, 1980) current and lifetime criteria for affective disorders.

BDI. Data were also collected on current depressive symptomatology using the BDI (Beck et al., 1979). The BDI is a well-established 21-item measure designed to assess current depressive symptomatology among clinically referred or community samples of adults.

Child Behavior Checklist (CBCL). Children's internalizing and externalizing problems were assessed using mother report on the CBCL for ages 4 to 16 (Achenbach, 1991). The CBCL is a well-validated 113-item measure that assesses behavioral and emotional problems among children. Parents rate each item on a 3-point scale ranging from *X* (*not true*) to *X* (*very true*) of the child in the past 6 months. The Internalizing and Externalizing broadband factors were used in this study.

Child ER. Children's displayed affect and ER strategies were coded using a system adapted by Gil-

liom et al. (2002) from the work of Grolnick et al. (1996). Children's emotional displays and ER behaviors were coded in 10-sec intervals. Joy, anger, and sadness were coded using facial and verbal cues of affect on a 4-point scale ranging from 0 (*none*) to 3 (*high*). The presence or absence of five mutually exclusive ER strategies was coded: (a) active distraction (purposeful behaviors in which the focus of attention is shifted away from the delay object or the task of waiting, including fantasy play, exploration of the room, talking with the mother, singing or dancing); (b) focus on delay object or task (speaking about, looking at, or trying to retrieve the cookie or toy; or speaking about or trying to end the waiting period); (c) passive waiting (standing or sitting quietly without engaging in any overt activity); (d) information gathering (asking questions aimed at learning more about the prize or waiting situation but not aimed at changing the situation); and (e) physical comfort seeking (touching the mother, requesting to be held). Based on a low base rate of physical comfort seeking, we excluded this strategy from analyses. For other strategies, a ratio was computed reflecting the number of intervals in which the child used the strategy out of the total number of completed intervals. All tapes were coded by graduate-level coders who were blind to mothers' diagnostic status. Initially, coders viewed tapes together and assigned codes by consensus. After establishing reliability, coders viewed tapes independently (kappas ranged from .64–.97).

To decrease the probability of Type I error, we reduced the number of behavioral variables by using a principal components analysis to identify patterns of ER in the delay of gratification task. All eight codes reflecting displayed affect and ER strategies were used in the principal components analysis with a direct oblimin rotation. Three factors with eigenvalues greater than 1.0 emerged, accounting for a total of 77% of the variance in the solution. The first factor, labeled Negative Focus on Delay (31% of variance), includes children's displays of sadness and anger, as well as sustained focusing on or preoccupation with the delayed object. The second factor, labeled Behavioral Distraction (29% of variance), includes children's use of various behaviors involving distraction or disengagement from the delayed object and the converse strategy of passive waiting (reverse coded). The third factor, labeled Positive Reward Anticipation (17% of variance), includes children's displays of joy and use of information gathering about the upcoming reward.

Pearson correlation coefficients were computed to examine intercorrelations among ER factors. Positive Reward Anticipation was negatively correlated with Behavioral Distraction ($r = -.33, p < .01$) but was not significantly correlated with Negative Focus on Delay ($r = .13, p = .24$). Negative Focus on Delay and Behavioral Distraction were negatively correlated with each other ($r = -.28, p < .05$). A visual inspection of uni-

variate distributions revealed that these factors were skewed. Therefore, log 10 transformations were performed on the Negative Focus on Delay and Positive Reward Anticipation factors to reduce positive skew, and a cube transformation was performed on the Active Distraction factor to reduce negative skew.

Results

Preliminary Analyses

A series of one-way analyses of variance revealed that there were no gender or race differences in ER factors, internalizing or externalizing behavior; however, expected developmental differences in ER emerged across 4-, 5-, and 7-year-olds. Four year-old children exhibited more negative focus on delay than 7 year-old children, $F(2, 75) = 4.50, p < .05$, and less behavioral distraction than 5- and 7-year-old children, $F(2, 75) = 6.05, p < .01$. Analysis of differences in strategy type across task (i.e., Cookie vs. Waiting) indicated that the Cookie Task elicited higher levels of focus on delay, $t(1, 76) = 2.67, p < .01$, and lower levels of behavioral distraction, $t(1, 76) = -3.40, p < .01$. No age or task differences emerged for positive reward anticipation. To account for task differences, we included task (Cookie vs. Waiting) as a covariate in subsequent analyses. The pattern of findings was the same when age was included as the covariate instead of task.

Direct Relations Between Maternal Depression, Child ER Factors, and Child Internalizing

Table 2 presents descriptive statistics and results of independent samples *t* tests of ER factors and CBCL scores by maternal diagnostic group status. As expected, compared to NCOD children, COD children showed higher levels of parent-reported internalizing and externalizing behaviors and a trend toward lower

positive reward anticipation. There were no maternal diagnostic group differences in behavioral distraction or negative focus on delay. Pearson correlations revealed that maternal BDI score was negatively associated with children's positive reward anticipation ($r = -.34, p < .01$), but was not related to children's use of behavioral distraction ($r = .03, ns$) or negative focus on delay ($r = -.07, ns$).

Positive reward anticipation was negatively associated with internalizing behavior ($r = -.35, p < .01$), but not with externalizing behavior ($r = -.17, p = .13$). Neither negative focus on delay nor behavioral distraction was associated with internalizing ($r = -.09, ns; r = -.02, ns$) or externalizing problems ($r = .18, p = .10; r = -.10, ns$).

Child ER as a Moderator of the Relation Between Maternal Depression and Child Internalizing Problems

The role of child ER factors as moderators of the relation between maternal depression and child internalizing problems was tested using a series of mixed effects linear models using restricted maximum likelihood estimation. Mixed-effects models can be used to jointly model the effects of fixed factors with the effects of random factors, such as family membership, in which data exhibit correlated or nonconstant variability. Thus, in cases where siblings participated, potential biases created by treating all the participants as independent are addressed.

Separate models were estimated for each ER factor with child internalizing as the dependent variable. Fixed effects included maternal diagnostic group, gender, the ER factor, and the interactions between diagnostic group and ER factor and between gender and ER factor. Family membership was included as a random effect. All independent variables were centered prior to inclusion in the model. Task (Cookie vs. Waiting) and mother's current BDI score were included as covari-

Table 2. Mean Scores and Standard Deviations for Child Emotion Regulation Factors and Internalizing and Externalizing by Maternal Diagnostic Group

Variable	Minimum	Maximum	NCOD ^a		COD ^b		<i>t</i>
			<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	
ER Factors (transformed)							
Negative Focus on Delay	0.35	0.91	0.45	0.09	0.47	0.12	0.42
Positive Reward Anticipation	0.14	0.79	0.48	0.13	0.43	0.12	1.80 ⁺
Behavioral Distraction	0.29	124.75	80.02	31.99	68.15	36.11	1.50
CBCL (raw scores)							
Internalizing	0.00	25.00	2.48	2.21	5.93	5.44	-3.44**
Externalizing	0.00	49.00	7.91	5.84	13.00	9.44	-2.74**

Note: NCOD = never-depressed mothers; COD = mothers with childhood-onset depression; ER = Emotion Regulation; CBCL = Child Behavior Checklist. ER factors have been transformed to reduce skewness.

^a*n* = 33. ^b*n* = 45.

p* < .05. *p* < .01. ****p* < .001. ⁺*p* < 10.

ates. Power analyses led to the decision not to explore three-way interactions.

Mixed models revealed a main effect for positive reward anticipation, $F(1, 71) = 9.04, p < .01$, that was qualified by a Positive Reward Anticipation \times Diagnostic Group interaction, $F(1, 71) = 5.26, p < .05$, and a Positive Reward Anticipation \times Gender interaction, $F(1, 71) = 5.04, p < .05$. Following procedures outlined by Holmbeck (2002), interaction effects were probed by computing and plotting slopes predicting internalizing behavior from positive reward anticipation for each diagnostic group and for each gender. Analyses indicated that for COD children, positive reward anticipation was negatively associated with internalizing problems ($\beta = -.47; B = -17.65, p < .01$), but for NCOD offspring there was no relation between positive reward anticipation and internalizing problems ($\beta = -.06; B = 2.14, p = .71$; see Figure 1). Additionally, the relation between positive reward anticipation and internalizing problems was statistically significant for girls ($\beta = -.59; B = -22.41, p < .01$) but not for boys ($\beta = -.21; B = -7.79, p = .12$).

The model for negative focus on delay revealed no main effect on internalizing problems and no interaction between negative focus on delay and diagnostic group. An interaction between negative focus on delay and gender, $F(1, 71) = 4.53, p < .05$, revealed that negative focus on delay was inversely associated with internalizing problems for girls ($\beta = -.31; B = -13.34, p < .05$) but not for boys ($\beta = .18; B = 7.50, p = .30$). There were no significant main or interaction effects for behavioral distraction on internalizing problems.

To test the specificity of these findings to internalizing problems, we replicated each mixed-effects model with externalizing problems as the dependent variable. There were no significant main or interaction effects for any of the ER factors for externalizing problems.

To examine the joint influence of diagnostic history and current depressive symptoms, we used BDI scores of 10 or greater as clinically significant (Beck & Beamesderfer, 1974) and assigned mothers to three groups: (a) no history of depression and subthreshold current depressive symptoms ($n = 29$); (b) history of

COD but no current depressive symptoms ($n = 21$); and (c) history of COD and current depressive symptoms ($n = 24$). Because there were only 4 participants without COD who had clinical levels of current depressive symptoms, we did not include this group in further analyses. Again, separate linear mixed models were estimated for each ER factor with child internalizing as the dependent variables. Fixed effects included depressive symptomatology group, gender, the ER factor, and the interaction between depressive symptomatology group and ER factor, with family membership included as a random effect and task included as a covariate.

Findings again emerged for positive reward anticipation, with main effects for depressive symptomatology group, $F(2, 66) = 3.47, p < .05$, and positive reward anticipation, $F(1, 66) = 6.05, p < .05$, and an interaction between the two, $F(2, 66) = 4.22, p < .05$. As shown in Figure 2, positive reward anticipation was significantly negatively associated with internalizing problems for children of mothers with both a history of COD and current elevated depressive symptoms ($\beta = -.46; B = -29.87, p < .05$) but not for offspring of COD mothers without current depressive symptomatology ($\beta = -.11; B = -3.27, p = .64$), nor for offspring of NCOD mothers ($\beta = -.03; B = -.44, p = .90$). The interaction between positive reward anticipation and depressive symptomatology group was not significant for externalizing behavior. There were no interaction effects for behavioral distraction or negative focus on delay and depressive symptomatology group for internalizing or externalizing problems.

Discussion

This study examined the relation of ER during a laboratory mood-induction task and internalizing problems among young children of depressed and NCOD mothers. Findings suggest that the experience of positive emotion in a negative emotion-inducing context may be a protective factor against internalizing problems for children of depressed mothers. For all chil-

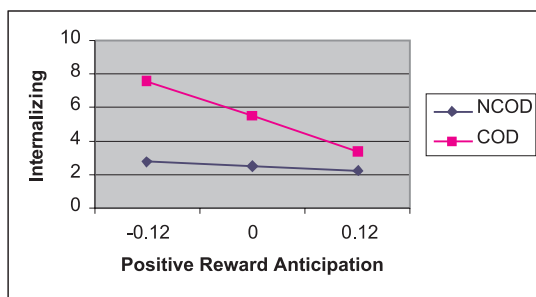


Figure 1. The relation (slope) between positive reward anticipation and CBCL raw internalizing scores by maternal diagnostic group, plotted at 1 SD above and below the centered mean.

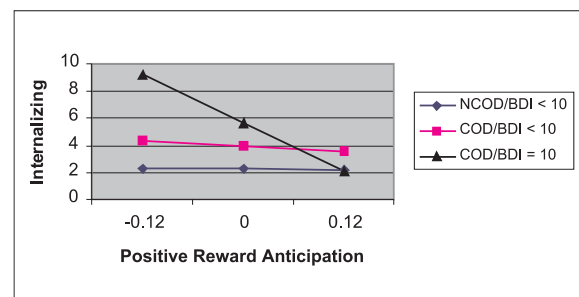


Figure 2. The relation (slope) between positive reward anticipation and CBCL raw internalizing scores by maternal diagnostic/BDI group, plotted at 1 SD above and below the centered mean.

dren, positive anticipation of the reward during the waiting period was associated with lower levels of internalizing problem behaviors. However, this link was amplified among offspring of depressed parents, such that reward anticipation was more strongly associated with internalizing problems for children of depressed mothers than for children of NCOD mothers.

Interestingly, the strongest inverse links between positive reward anticipation and internalizing problems were found for children of mothers who had a history of COD *and* were currently experiencing elevated depressive symptoms. It may be that mothers reporting current depressive symptoms suffer from a more recurrent or pervasive form of disorder. Alternatively, this finding may suggest that the influence of children's reward anticipation on risk for internalizing problems is related to the recency of maternal depressive illness. Mothers typically organize pleasant experiences and model positive emotions for their children; however low motivation and emotional withdrawal among currently depressed mothers may result in a family environment with less naturally occurring reward experiences. Furthermore, current maternal depression is associated with diminished emotional reciprocity (Cohn, Campbell, Matias, & Hopkins, 1990), suggesting that mothers who are currently experiencing depressive symptoms are less likely to engage with their children in generating and reciprocating positive emotion. Thus, children of mothers with current depressive symptoms potentially have greater need to seek out and up-regulate their own positive affect and may require greater self-sufficiency in regulating and generating positive emotion.

This study reinforces the value of a transactional perspective in understanding how maternal depression is related to children's adjustment. Although living with a depressed parent is associated with disruptions in the family's emotional climate, the influence of these disruptions on the risk of internalizing problems in the child will depend on the child's own resources for managing these affective disruptions. A transactional perspective may be applied to other child factors, such as social cognition, attributional style, or physiological processes, and other factors in the environment, such as paternal psychological functioning and social support, to further advance an understanding of adaptation and vulnerability among children of depressed parents.

The findings of this study highlight the importance of studying children's generation and regulation of positive emotion, particularly as a potential protective factor for children of depressed parents. However, these data do not allow us to specify the precise aspects of positive emotion that are serving this protective function. The observed positive reward anticipation variable used in this study measures at least two important components of positive emotion: (a) the ability to

up-regulate positive affect in the face of negative affect and (b) the mobilization of appetitive systems to anticipate a reward. These components of positive emotion may operate separately, as one involves the regulation of an aversive affective state and the other involves the enhancement of an appetitive affective state. Nonetheless, the two components could involve inputs and outputs from common neural systems that subserve appetitive motivation (Rolls, 1999; Schultz, 2000).

Research conducted with adults supports the role of both components of positive emotion in understanding risk for internalizing problems. Emerging affective neuroscience models of depression implicate altered reward-processing systems as a key feature of depressive disorders (Depue & Iacono, 1989; Forbes & Dahl, *in press*; Fowles, 1980). These models posit that depression is associated with disrupted motivation to obtain reward. The tripartite model of depression also posits that reduced positive affect is a core feature of depression that distinguishes it from other disorders (Clark & Watson, 1991). Few studies, however, have measured reward anticipation in children and adolescents, particularly in relation to internalizing problems or depression.

Our findings are also consistent with studies conducted with adults examining the use of cognitive processes to cultivate positive emotion. These studies suggest that the mobilization of positive emotion in the context of stress is associated with lower depressive symptomatology and greater psychological resilience, perhaps mediated by the physiological effects of positive emotion on the central and peripheral nervous system (Garnefski et al., 2004; Tugade & Fredrickson, 2004). These findings are also consistent with Fredrickson and Joiner's (2002) broaden-and-build theory of positive emotion. According to this theory, positive affect leads to a broadening of both attention and cognition, enhancing creativity and flexibility in coping with problems. The experience of positive emotion thereby leads to an upward spiral that can have positive implications on an individual's ability to regulate negative emotion. Findings may also relate to the construct of optimism as a protective factor against depression (Gillham, Reivich, & Shatte, 2001). Future research integrating both observational and neurobehavioral measures is needed to better understand how children regulate and generate positive emotion and to disentangle the key components of positive affect regulation.

Interestingly, positive reward anticipation was more strongly linked to internalizing for girls than for boys. Several studies have suggested that girls are socialized to express and manage emotions differently than boys (Block, 1983; Eisenberg et al., 1998); however, few studies have tested whether ER is differentially associated with outcomes based on children's gender. It may be that the ability to mobilize positive emotion is more important for girls than boys, as girls report experienc-

ing more frequent and intense negative emotions than boys (Silk et al., 2003). Given the marked gender difference in depression that emerges during adolescence, identification of potential risk mechanisms that could operate differently for boys and girls is an important endeavor for future research.

Surprisingly, we found little evidence that behavioral distraction or sustained focus on the delay were associated with children's internalizing symptoms, either on their own or in combination with parent history of depression. These findings contradict a small body of research suggesting that focus on distress is a maladaptive approach to managing emotion and that behavioral distraction is an adaptive approach to managing emotion (e.g., Gilliom et al., 2002; Grolnick et al., 1996; Mischel & Ebbesen, 1970). This discrepancy could be related to limited statistical power to test for relations between ER strategies and adjustment in our relatively modest sample. The study was also underpowered to detect interaction effects between behavioral distraction or negative focus on delay and parent history of depression in predicting children's adjustment (Aiken & West, 1991).

The discrepancy in past research on attention could also relate to limitations in the observational methodology. Although we were able to code children's overt behaviors and vocalizations, we know little about potentially co-occurring cognitive processes. For example, a child who appears to be visually focusing on the delayed object could actually be engaging in cognitive restructuring or other presumably adaptive cognitive processes. This could explain our unexpected finding that, for girls, focusing attention on the prize was associated with lower internalizing problems. It is likely that these girls were engaged in unobservable cognitive strategies for regulating emotion. Alternatively, the focus on delay code could be tapping into the construct of persistence, which might be a protective factor against internalizing in its own right. The integration of interview and self-report techniques with observational methodology may help to further specify the exact nature of constructs tapped.

Another limitation of this study is the fact that different delay stimuli (cookie vs. toy) and waiting time lengths were utilized at different ages. In this study, we attempted to utilize varying developmentally appropriate stimuli at different ages to tap similar underlying constructs (e.g., heterotypic continuity). As a result; however, it is not possible to discern whether differences across ages are driven by differences in the task or by developmental differences.

An additional limitation of the study involves the difficulty disentangling ER from related constructs, such as emotional reactivity and broader self-regulation, using observational methods. Emotional reactivity refers to the intensity of the individual's emotional response to a stimulus or situation, whereas ER refers

to the processes involved in the initiation, maintenance, or modification of this response (Derryberry & Rothbart, 1997; Forbes & Dahl, *in press*). However, emotion generation and ER can occur simultaneously and automatically, with constant feedback loops between generative and regulatory processes at cortical and behavioral levels (Campos et al., 2004; Davidson, Jackson, & Kalin, 2000).

Based on a factor analysis of observable behavior, we have identified three styles of responding to a laboratory delay task. These styles probably reflect co-occurring processes involved in both the generation and regulation of emotion; thus, we did not attempt to disambiguate these processes. Theorists have recently highlighted the complexity in attempting to separate emotional reactions into distinct reactive and regulatory components (Campos et al., 2004; Goldsmith & Davidson, 2004). Given this high degree of interconnection, studies that attempt to disambiguate these constructs (e.g., Gilliom et al., 2002) and studies that examine their joint influence (e.g., Maughan & Cicchetti, 2002) are likely to advance our understanding of children's adjustment. We also recognize that although we attempted to focus on ER, other aspects of children's self-regulation, such as the ability to inhibit a prepotent response or to follow directions, also influence children's behavior during this task. The use of multimethod approaches utilizing psychophysiological, self-report, and behavioral methodologies will be valuable in attempting to disambiguate the construct of ER from these related and overlapping constructs (see Cole et al., 2004).

It is also important to note that this study is cross-sectional and cannot address the directionality of the observed effects. Prospective longitudinal research within high-risk populations will be crucial in addressing whether ER difficulties precede internalizing problems or, alternatively, emerge as concomitants or even consequences of internalizing problems. We are currently collecting follow-up data on the participants in this study that will help us better address the issue of directionality. Another potential concern is the fact that our sample comes from a variety of sources, including other research studies, government assistance programs for income-eligible families, and community advertisements. The diversity of recruitment sources used could have resulted in increased "noise," although comparison of groups on several factors indicated modest differences among recruitment sources. Moreover, this strategy might have increased the generalizability of our findings, because they are not limited to one particular subsample of depressed individuals or controls.

Despite these potential limitations, this study has several notable strengths. The children we studied are the offspring of a carefully delineated sample of parents identified as having had a very early onset mood

disorder. The findings are based on a multimethod, multi-informant design that includes structured clinical interviews, behavioral observations, and parent report of child symptomatology. Our measure of ER is based on children's behavior during a laboratory mood-induction paradigm designed to closely resemble a frequent naturally occurring scenario in children's lives. This study adds to a small but important literature addressing ER among children at risk for depression and is one of the first to focus on young children's use of positive affect in a potentially distressing situation. Replication of these findings could have implications for developing prevention and intervention programs for children of depressed parents. For example, teaching children skills for seeking out and anticipating rewards and enhancing or maintaining positive emotions may help prevent internalizing problems among this high-risk population.

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