

# Emotional Exchange in Mother–Child Dyads: Stability, Mutual Influence, and Associations With Maternal Depression and Child Problem Behavior

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This study examined the stability of the child and maternal affective expression and maternal responsiveness and the mutual influence of child and maternal expression of emotion. The authors tested whether maternal depression and child problem behavior were associated with the pattern of emotional exchange within the mother–child dyads. The sample consisted of 69 mother–child dyads (children aged 2–5 years), with 32 of the mothers having childhood-onset depression. Mothers were mostly stable in their affective expression (positive and negative) and responsiveness, whereas children were only stable in positive expression. Within the dyads, mothers seemed to play a more important role in regulating children's later emotional expression. Maternal depression was associated with concurrent maternal responsiveness and their reduced positive expression over time. Results are discussed in relation to the differential function of parental general positivity and responsiveness and the interpersonal transmission of emotional problems.

*Keywords:* emotional exchange, affective expression, mother–child dyad, child problem behavior, maternal depression

It has been widely acknowledged that the quality of interactions with caregivers is crucial for children's social and emotional development. One of the ways whereby parents affect children's social emotional development is dyadic interaction (Parke, MacDonald, Beitel, & Bhavnagri, 1988). In recent years, there has been a growing interest specifically in the emotional aspects of parent–child interaction (Eisenberg et al., 1995), as emotion is an important medium through which parents and children communicate (Maccoby, 1992). Although associations between parents' emotional expressivity and children's emotionality have been explored, relatively little is known about the stability and change in emotional exchange between mothers and young children (Campos, Frankel, & Camras, 2004; Cole, Martin, & Dennis, 2004). Mothers' characteristic ways of affective expression set the emotional environment to which children are repeatedly exposed and thus may be substan-

tially influential to children's emotional socialization. Similarly, individual differences in children's emotionality may elicit differences in maternal expression of emotion (Bell, 1968; Sameroff & Chandler, 1975). The present study sought to extend existing knowledge of the affective quality of parent–child interactions by examining the emotional exchange in mother–child dyads. Specifically, we examined the stability of positive and negative affectivity and the mutual influence of expressed emotion in young children and their mothers. In addition, we investigated other child and maternal attributes that may be associated with patterns of affective exchange over time.

## Mother–Child Emotional Exchange

Affective exchange between parents and young children appears to play an important role in the development of children's emotion regulation strategies and interpersonal relationships (Kochanska, 1991; Zahn-Waxler & Radke-Yarrow, 1990). Izard and colleagues (Izard, 1977; Izard & Malatesta, 1987) proposed that the expression of emotion in one member of an interpersonal relationship (e.g., a mother–child dyad) tends to elicit emotions in the other member. Consistent with this hypothesis, Termine and Izard (1988) found that infants expressed more joy and looked longer at their mothers in response to their mothers' joyful expression, whereas they showed greater sadness and gaze aversion in response to their mother's expression of sadness. Several other studies also have documented that infants' and preschoolers' emotional expression and regulation strategies differ as a function of the caregivers' active or passive

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involvement (e.g., Bridges, Grolnick, & Connell, 1997; Denham & Grout, 1993), suggesting that the expression of positive and negative emotion is associated with differences in the quality of subsequent parent-child interaction, particularly in early childhood. Accordingly, in the present study, we focused on the expression of both positive and negative emotion of mothers and young offspring. Adult studies of emotionality using diverse approaches (i.e., viewed as either a dispositional or more transient state) suggest that positive and negative emotion are relatively independent dimensions, albeit moderately correlated (Belsky, Hsieh, & Crnic, 1996). Similarly, in studies of infant temperament, positive and negative emotionality also have emerged as independent dimensions (Belsky, Fish, & Isabella, 1991; Goldsmith & Campos, 1990). Child positive and negative emotionality, from laboratory observation and parental report, have been found to load onto different factors (Belsky et al., 1996; Rothbart, Ahadi, & Hershey, 1994).

Theories of socialization emphasize the contribution of both children and parents in the development of the parent-child relationship (Bell, 1968; Bugental & Goodnow, 1998; Sameroff & Chandler, 1975). The establishment and the maintenance of mutuality in emotional exchange appear to be an integral part of the socialization process between parents and children. Although much research has been conducted on parents' effort to regulate children's emotion, research examining child effects on parents' emotion has been relatively lacking (Gelfand, Teti, & Fox, 1992; Murray, Stanley, Hooper, King, & Fiori-Cowley, 1996). Saarni (1990) has noted that the management of emotional expression is reciprocally influenced by the relationship context. That is, in continuing coconstruction of events, parents and children mutually influence or regulate each other's emotions. Infant studies of mutual emotion regulation highlight two qualities that promote healthy child adjustment: synchrony in and reciprocity of positive emotion and caregiver responsiveness to infant distress (Cole, Teti, & Zahn-Waxler, 2003). Although research on parent-child emotional exchange beyond infancy and toddlerhood is relatively limited, some studies have demonstrated reciprocity in expressed positive affect between preschool children and their mothers (Kochanska, 1997; Kochanska & Aksan, 1995). Conger and colleagues (Conger & Ge, 1999; Cui, Donnellan, & Conger, in press; Kim, Conger, Lorenz, & Elder, 2001) have also provided evidence for parents' and adolescents' mutual influences in negative and positive affect over time.

In light of evidence that attests to the importance of caregiver responsiveness to the socialization of emotion, we also investigated maternal responsiveness to children's positive emotion and its relationship to child affective expression. Recently, researchers have differentiated between general constructs of parental positivity and more specific caregiving attributes such as responsiveness to children's specific emotions (Davidov & Grusec, 2006; Goldberg, Grusec, & Jenkins, 1999), as the functions of these parenting dimensions may differ. Whereas parental general positivity provides children with opportunities to experience a

positive affective environment and learn positive expression through modeling (Isley, O'Neil, Clatfelter & Parke, 1999), parental responsiveness (e.g., to distress) may serve to facilitate children's adaptive response to negative emotion (Davidov & Grusec, 2006). Goldberg et al. (1999) have further proposed that it is important to assess the impact of parental responsiveness in different interactive contexts, as parents' tendency to respond to children's positivity and negativity may vary. Prior research has focused mainly on parental responsiveness to children's negative emotion (e.g., Davidov & Grusec, 2006; Eisenberg, Fabes, & Murphy, 1996), with fewer studies on parents' expression of positive emotion in general (Gardner, 1987; Pettit & Bates, 1989), and responsiveness to children's expression of positivity in particular (Shaw et al., 2006). We propose that parental responsiveness to child positive emotion may serve to reinforce and promote positive reciprocity in parent-child interaction and, based on recent findings that the maintenance of positive emotion helps buffer against negative emotional experience (Tugade & Fredrickson, 2004), reduce children's subsequent expressions of negative emotion.

### Maternal Depression and Emotionality

Although much of the research on parent-child interaction has been conducted on normally developing families and applied to normative developmental processes (e.g., Eisenberg et al., 1996, 1995), knowledge of affective exchange and regulation may be helpful in understanding mechanisms underlying the development of psychopathology (Calkins, 1994; Cole et al., 2004). Problems in regulating and appropriately expressing emotions have been regarded as a defining characteristic of many types of psychopathology, including depression (Cole et al., 2003). Maternal expressed emotion during mother-child interactions sets the tone for the affective environment of children's early interpersonal relationships, and thus may play a salient role in the interpersonal transmission of psychopathology.

Depressed parents have consistently demonstrated difficulty in regulating their children's and their own emotions (Goodman & Gotlib, 1999; Kovacs & Goldston, 1991). Depression may be associated with impairments in parenting through different mechanisms. First, the negative mood experienced by mothers may lead directly to a negative shift in the valence of emotion expressed toward their children. Depressed mothers have often been found to express less positive and more negative affect toward their children (Cohn & Tronick, 1987; Downey & Coyne, 1990). Second, depressive mood may diminish mothers' sensitivity and responsivity to children's cues and needs (Rutter, 1990). Studies of parenting behavior in currently depressed parents have reported associations with low responsiveness and involvement (e.g., Cohn & Tronick, 1987; Hops, Biglan, Sherman, & Arthur, 1987).

In addition, it is possible that the age of onset of maternal depression may have an impact on the type of problematic interactions mothers of depressed children have with their children. Mothers with a history of childhood-onset depres-

sion (COD) may be particularly vulnerable for showing deficits in affectively laden interactions with their children, presumably because of their own disrupted development of emotion regulation during childhood (Kovacs & Goldston, 1991). Although much research has linked dysregulation of emotion with parents' concurrent depressive symptoms, recent studies using the present sample have documented lower rates of positive emotion and higher rates of negative emotion among mothers with COD after accounting for concurrent maternal depressive symptoms (Shaw et al., 2006; Silk, Shaw, Forbes, Lane, & Kovacs, 2006). Consistent with these findings, we expected a history of COD to be associated with mothers' overall deficits in expression of positive and negative emotion. In contrast, we expected high levels of current maternal depressive symptoms to be more detrimental to their ability to respond effectively to their children's expression of emotion (i.e., responsiveness to child positive expression).

### Child Problem Behaviors and Emotionality

Children with externalizing and internalizing behaviors share problems in regulating negative emotions (e.g., Shaw, Keenan, Vondra, Delliquadri, & Giovannelli, 1997), although the precise nature of regulatory difficulties may vary depending on the degree of co-occurring internalizing and externalizing symptoms (Eisenberg, Fabes, Guthrie, & Reiser, 2000; Rothbart & Bates, 1998). Children with more pure forms of internalizing problems typically demonstrate high levels of sadness and anxiety, whereas children with primarily externalizing problems commonly have issues in regulating anger (Denham et al., 2000). Despite differences between children with purer forms of internalizing or externalizing problems, in practice, substantial co-occurrence has been observed, with internalizing and externalizing symptoms being moderately to strongly correlated (Zahn-Waxler, Klimes-Dougan, & Slattery, 2000). In addition, because children with internalizing and externalizing problems have difficulties in regulating negative emotion and are both likely to elicit less positive and more negative emotion

in parents, we examined their joint influence on later parental affective behavior. As maternal and child affective expressions were measured via observation, child problem behavior was assessed using maternal report. This strategy allowed us to examine how maternal perceptions of early problem behavior might relate to later observations of maternal expressions of emotion and responsiveness accounting for children's expressed emotions.

### The Present Study

The present study investigated patterns of emotional exchange and response between mothers and their young children during emotion regulation tasks across two time points, when children were at ages 2–3 (Time 1 [T1]) and 4–5 (Time 2 [T2]). We included a sample of children and their mothers, approximately half of whom had a history of COD. Our primary goals were to examine the stability and mutual influence of maternal and child affective expression as well as whether and how maternal depression and child problem behavior were associated with affective exchange in mother–child dyads. Figure 1 presents path diagrams of the hypothesized relationships among variables. Four models were tested: (a) mother–child positive affective expression, (b) mother–child negative affective expression, (c) maternal responsiveness to child positivity and child positive expression, and (d) maternal responsiveness to child positivity and child negative expression.

On the basis of the reviewed literature, we expected that (a) mothers' and children's expression of emotion at T1 would be positively associated with their expression of the same emotion at T2; (b) mothers' expression of positive (or negative) emotion would be positively associated with children's display of positive (or negative) emotion concurrently and over time; (c) maternal responsiveness to child positivity at T1 would be associated with increased child positive emotion and decreased negative emotion at T2; (d) maternal history of COD would be negatively associated with maternal and child positive emotion and positively associated with maternal and child negative emotion,

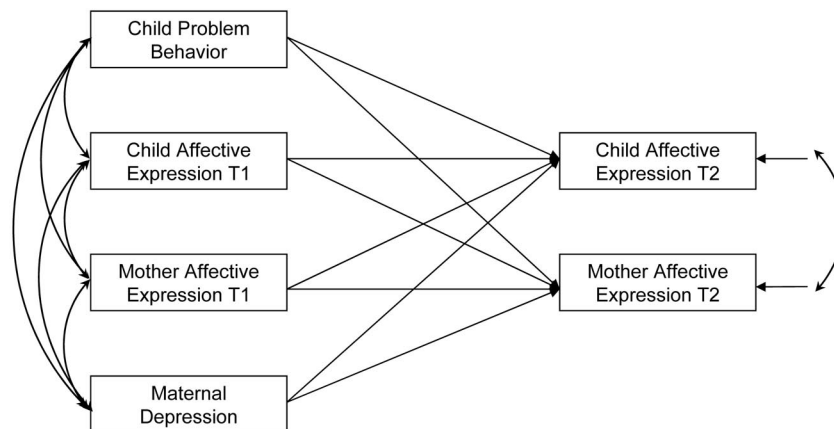


Figure 1. The hypothesized Actor-Partner Interdependence model. T1 = Time 1; T2 = Time 2.

whereas current depressive symptoms would be negatively associated with maternal responsiveness; and (e) child problem behavior would be negatively associated with child and maternal positive expression and positively associated with child and maternal negative emotion concurrently and at follow-up.

## Method

### Participants

Participants were 69 mother-child dyads, including 32 mothers with a history of COD and 29 mothers never depressed (NCOD). Mothers and their children were participants in a Program Project focusing on risk factors for childhood-onset mood disorder. COD mothers met Diagnostic and Statistical Manual of Mental Disorders (*DSM-III*; American Psychiatric Association, 1980; *DSM-IV*; American Psychiatric Association, 1994) criteria for major depressive and/or dysthymic disorder by age 15. Of the mothers, 6 (19%) of the COD mothers and 2 (7%) of the NCOD mothers participated with 2 of their children. To qualify for inclusion in the present sample, mothers and children had to have completed at least two appointments (one between the age of 2 and 3 and one between the ages of 4 and 5) at the Parent-Child Interaction laboratory of the Program Project.

Children on average were 2.45 years of age ( $SD = .51$ ) at T1, and 51% of offspring were boys. Efforts were made to ensure the NCOD group was similar to the COD group on sociodemographic characteristics. There were no group differences on child age ( $M_s = 2.45$  and  $2.44$ ;  $SD_s = .53$  and  $.48$  for COD and NCOD, respectively), child gender (COD: 47% male and NCOD: 55% male), ethnicity (50% COD were European American vs. 65% of the NCOD group), and mothers' marital status (57% COD were married or living with partners vs. 79% of the NCOD). However, NCOD mothers were found to be more highly educated than COD mothers (72% of the NCOD mothers had completed some college or achieved a degree vs. 31% of the COD mothers),  $\chi^2(1, N = 61) = 10.31, p = .001$ .

### Recruitment

Families of COD mothers were recruited through prior research studies or community advertisements. Nine COD mothers had been enrolled in a longitudinal naturalistic follow-up of COD (Kovacs, Obrosky, Gatsonis, & Richards, 1997), and the remaining 23 were recruited from the community. The NCOD families were recruited via one of three ways: other research studies ( $n = 7$ ), the general community ( $n = 10$ ), or through special community programs, a local Women, Infants, and Children (WIC) center ( $n = 12$ ). All adult participants were required to be free of major systemic medical disorders and without evidence of mental retardation.

### Procedure

At ages 2, 3, 4, and 5, children and mothers completed a 2-hr laboratory visit, during which a series of emotion

regulation tasks were administered, and the mother-child interaction was observed. The 20- to 25-min emotion regulation procedure consisted of a series of 4-5 tasks designed to elicit positive and negative affect in children. Each task involved a toy with which mothers and children played together, and all mothers were instructed to follow the same sequence. At each age, different tasks were selected in order to induce comparable levels of emotion in children of different ages (Shaw et al., 2006). Although most tasks were designed to elicit positive affect in children, at least one of the tasks at each age was intended to provide a provocative or scary element (e.g., wiggle ball, a ball that produces flashing lights and shrill sounds, at age 3).

### Measures

For the present study, measures at T1 refer to assessments and observations when children were 2 ( $n = 40$ ) and/or 3 ( $n = 59$ ) years old. For those who completed assessments at both ages 2 and 3 ( $n = 30$ ), their scores were averaged to create the T1 measures. Similarly, T2 measures were obtained at age 4 ( $n = 64$ ) and/or 5 ( $n = 36$ ), or in cases in which assessments of both age points were available ( $n = 31$ ), scores were averaged. Children with averaged scores at T1 (43.5%) and T2 (44.9%) versus single data points did not differ on any measures of affective expression.

*Beck Depression Inventory (BDI).* The BDI (Beck, Steer, & Garbin, 1988) was administered to the mothers at T1. The BDI is a well-established 21-item measure assessing current depressive symptomatology, and each item is rated on a 4-point (0-3) scale. A total BDI score was generated on the basis of the sum of the most deviant responses endorsed for each item; higher scores reflect higher depressive symptomatology. The BDI scales had a high internal consistency (Cronbach's  $\alpha = .91$ ).

*Child Behavior Checklist (CBCL).* At T1, children's problem behavior was assessed using maternal reports from the CBCL (Achenbach, 1992), a widely used parent-report measure that has two broadband factors, internalizing and externalizing problems. The Internalizing Problems scale consists of subscales measuring *depressed* and *withdrawn* behavior (e.g., doesn't want to go out, looks sad, upset by separation), and the Externalizing Problems scale includes subscales of *aggressive and destructive* behavior (e.g., defiant, destroys others' things, cruel to animals). Mothers responded to the items on a 3-point scale regarding the occurrence of child behavioral and emotional problems (from 0 = *not true* to 2 = *very/often true*). Maternal ratings on internalizing and externalizing behaviors correlated highly ( $r = .81, p < .001$ ). Thus, for the purpose of the present study, the total problem score was used.

*Child and maternal affective expression.* Children's and mothers' affective expression and mothers' contingent response to children's positive emotion were coded from videotaped mother-child interactions. In coding the expression of emotion, we considered physical gestures and verbal comments that were positive or negative in both content and affect (Shaw et al., 2006). Children's and mothers' affective expression and responses were coded separately. For each

participant, all instances of emotion expression that fit the criteria of a particular emotion code (described below) were counted within 10-s intervals, and participants were subsequently assigned a global score for that emotion code. The 4-point global coding system was based primarily on the frequency of each type of affective expression displayed and also allowed coders to give weight to more extreme instances of emotion that could not be assigned, relying solely on interval codes, such as intensity.

*Maternal positive expression* included all instances of (a) positive physical gestures (e.g., smiling, laughing, kissing, hugging) directed toward the child; (b) statements indicating approval (e.g., “good job”), affirmation of, or affection toward the child that were sufficiently affectively charged; and (c) responses to child affect that included positive physical gestures and/or positive verbal comments, described above. Coders rated maternal positive affect on the basis of a 4-point scale, with higher scores indicating greater frequency and intensity of positive expression. *Child positive expression toward mother* was defined in a similar manner to that of maternal positive expression.

*Maternal negative expression toward child* included all instances of (a) whining, nagging, complaints, sarcasm, or reprimanding the child, accompanied by negative affect such as distress and frustration; (b) maternal disruptive behavior such as yelling or name-calling and physical aggression (e.g., pushing, hitting, excessive roughness); and (c) negative feedback directed to the child’s affect or behavior. A 4-point global score was then assigned on the basis of the frequency and intensity of negative expressions during the entire observed period. *Child negative expression toward mother* was coded on the basis of actions and statements indicating negative feelings toward the mother. These behaviors and statements included complaints, whining, and crying directed at the mother as well as hitting or throwing toys at the mother.

*Maternal responsiveness to child positive affect*, which henceforth is referred to as *maternal responsiveness*, was indexed by the ratio of maternal contingent positive response to children’s total positive expression toward the mother. Mothers’ responses that maintained or escalated children’s positive affect, including physical gesture and comments that occurred within 3 s of children’s display of positive emotion, were counted as maternal contingent response. A percentage was then calculated by dividing the counts of maternal contingent positive response by the total number of instances of children’s positive expression toward mothers. Finally, a 4-point global rating of maternal responsiveness was generated on the basis of the percentage of maternal contingent response (i.e., 1 = 0%–24%, 2 = 25%–49%, 3 = 50%–74%, and 4 = 75%+).

Videotapes were coded by a team led by Daniel S. Shaw and included two doctoral students in clinical and developmental psychology and two research assistants with undergraduate degrees in psychology. Coders were unaware of mothers and children’s group status and research hypotheses. Because mothers’ contingent response to children’s emotions was coded, the same coder coded the emotion expressions of both mothers and children in order to max-

imize coding efficiency. To ensure intercoder reliability, 15% of the tapes were coded by at least two coders. As suggested by Shrout and Fleiss (1979), the intraclass correlation coefficient (ICC) was calculated as the index of the reliability among coders. ICCs were .88 and .77 for maternal positive and negative expression, respectively, .68 and .70 for child positive and negative expression, respectively, and .71 for maternal contingent positive response.

### Data Analysis

In the present study, the unit of analysis is the dyad, whereas the unit of measurement is at the level of individuals. The mother’s and the child’s affective expression during their interaction are considered to be interdependent; that is, one person’s emotion is postulated to affect the emotional expression of the other member of the dyad. To account for the nonindependence between the mother’s and child’s measures, we adopted the Actor-Partner Interdependence Model (APIM), proposed by Kenny and colleagues (Cook & Kenny, 2005; Kenny, 1996). APIM allows for the estimation of both individual and dyadic factors by retaining the individual unit measures and treating them as being nested within the dyad (Cook & Kenny, 2005). The central components of the APIM are the actor effects and the partner effects. In Figure 1, the actor effects are represented by the paths from mothers’ T1 to T2 measures and the paths from children’s T1 to T2 measures. In this study, the actor effects represent the stability in mothers’ and children’s affective expression over time. Partner effects are the paths from mothers’ T1 affect to children’s T2 affect and the paths from children’s T1 affect to mothers’ T2 affect. The partner effects represent the association between the expressed emotion of one member of the dyad (e.g., the mother) and her partner’s (e.g., the child) expression of emotion at a later time point. To accurately estimate the relationships in the longitudinal model, it is critical that actor effects (stability) be estimated controlling for partner effects and similarly that partner effects (mutual influence) be estimated controlling for actor effects. We used the path analysis approach, which allows the direct translation of the hypothesized model into statistical estimation when the members in the dyads are distinguishable (Cook & Kenny, 2005).

### Results

Four hypothesized APIM models were estimated. As described earlier, 8 of the mothers in the sample had 2 children participate in the study. Although laboratory visits for all siblings in this sample were on different days, and in some cases were months apart, mothers may have similar ways of interacting with their own children, and measures of siblings may be correlated. To test the degree of nonindependence in the data due to the inclusion of siblings, we estimated a random effect analysis of variance (ANOVA) model for each of the maternal and child variables of affective expression. These models, with children nested within mothers and no predictors specified, provided infor-

mation about how much variation in these variables lies at the mother and the child level (Bryk & Raudenbush, 1992). For most of the variables estimated, results indicated that variation at the mother level was not significant, and most of the variance in the outcome was at the child level. For maternal negative affect and child negative affect at T2, however, the between-mother variation was significant ( $z = 3.35, p < .001$  and  $z = 2.75, p < .01$ , respectively), which indicated that on these two measures, data from siblings were not independent. For the subsequent estimation of the models that involved these two variables, analyses were conducted with the full sample and with 1 of the siblings from each family randomly removed. As results were not different except for slight changes in the sizes of regression weights and/or correlations, we retained and report on the full sample for all analyses.

Also, as children's ages varied to some extent and maternal education differed between COD and NCOD groups, the associations between T2 outcome measures and child age and maternal education level were examined initially. No significant associations between either age ( $r_s = -.16$  to  $.18, ns$ ) or maternal education,  $F_s(1, 59) = 0.48-2.49, ns$ , were found with any of the T2 dependent measures (i.e., maternal positive expression, negative expression, and responsiveness and child positive and negative expressions). Thus, child age and maternal education were not controlled in subsequent analyses.

Descriptive statistics and correlations among all study variables are shown in Table 1. Mothers' depressive symptoms were positively correlated with their ratings of children's problem behaviors. At T1, maternal positive affective expression was positively associated with maternal responsiveness and child positive expression and inversely correlated with child negative expression; maternal responsiveness was positively associated with child positive expression. At T2, in addition to the correlations presented at T1, there was a negative correlation between mothers' positive and negative affective expression; and children's positive and negative expression were also negatively correlated. Across the two time points, maternal positive and negative expression, maternal responsiveness, and child positive expression measured at T1 and T2 were positively correlated; however, child negative expressions at T1 and T2 were not correlated.

The hypothesized path models were estimated using the AMOS 5.0 program (Arbuckle, 2003). Because these were saturated models (i.e., all possible relationships between variables were estimated), the model fits are not reported. As stated earlier, the focus of the analyses was on the associations between T1 and T2 maternal and child emotional expression, controlling for the concurrent correlations within the dyads. To ensure that the inclusion of child problem behavior and maternal depression did not wash out any of the estimated relationships, all four models presented below were reestimated without these two variables. As the statistical significance of paths was not different when T1 child problem behavior and maternal depression were excluded from models, analyses are presented with both variables in the models below.

Table 1  
Means, Standard Deviations, and Correlations of Variables

	M	SD	Correlations (N = 69)														
			1	2	3	4	5	6	7	8	9	10	11	12	13		
1. COD			—														
2. MBDI	7.25	7.41	.56***	—													
3. CPrblm	51.57	10.66	.48***	.43***	—												
4. MPA <sub>t1</sub>	3.22	0.82	-.03	.06	-.08	—											
5. CPA <sub>t1</sub>	3.21	1.00	-.15	-.02	-.10	.41***	—										
6. MNA <sub>t1</sub>	1.64	0.79	0.07	.05	.14	-.09	.08	—									
7. CNA <sub>t1</sub>	1.80	0.82	-.01	.09	.15	-.42***	-.14	.23	—								
8. MRES <sub>t1</sub>	2.69	0.96	-.23	-.29*	-.19	.28*	.42***	-.14	.08	—							
9. MPA <sub>t2</sub>	3.17	0.94	-.36	-.28*	-.34**	.24*	.13	-.16	-.06	.44***	—						
10. CPA <sub>t2</sub>	3.17	0.95	-.16	-.17	-.15	.36**	.38**	-.03	.01	.31*	.49***	—					
11. MNA <sub>t2</sub>	1.33	0.64	-.05	-.07	.08	.00	.05	.56***	.10	-.13	-.26*	-.08	—				
12. CNA <sub>t2</sub>	1.54	0.74	.25*	.08	.29*	.00	-.21	.08	.04	-.26*	-.44***	-.26*	.47***	—			
13. MRES <sub>t2</sub>	2.30	0.83	-.15	-.07	-.23	.11	-.02	-.13	.06	.31*	.58***	.29*	-.17	-.14	—		

Note. All correlations between maternal COD status and other variables are Pearson correlations (calculated with COD group coded as 1 and control group coded as 0), which are equivalent of point-biserial correlations. COD = mother's childhood-onset depression status; MBDI = maternal depressive symptom score from the Beck Depression Inventory; CPrblm = child problem behavior; t1 = Time 1; MPA = maternal positive affective expression; CPA = child positive affective expression; MNA = maternal child negative affective expression; CNA = child negative affective expression; MRES = maternal responsiveness to child positive affect; t2 = Time 2. \*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$ .

### *Mother–Child Positive Affective Expression*

The hypothesized model and path coefficients are presented in Figure 2a. As specified earlier, maternal history of COD rather than current depressive symptoms was examined in this model. Both child and maternal positive expression at two time points were positively associated, suggesting stability in their positive expression toward each other over time. Maternal positive expression at T1 was positively associated with child positive expression at T2, which indicated that mothers' positive expression predicted an increase in children's positive expression over time. Child positive expression at T1, however, was not predictive of maternal positive expression at T2. Child problem behavior at T1 was not associated with either child or maternal positive expression at follow-up. Maternal history of COD was negatively associated with mothers' positive expression at T2, indicating that mothers with a history of COD were less positive to their children at T2 compared with mothers in the control group. To ensure that this relationship was not accounted for by current maternal depressive symptoms, we computed a separate regression analysis, using BDI at T1 and COD status as independent variables and maternal positive expression at T2 serving as the dependent variable. The association between maternal COD and T2 positive expression, although attenuated by maternal BDI scores to a small extent, approached significance ( $B = -.47$ ,  $SE = .26$ ,  $\beta = -.25$ ,  $p = .07$ ); maternal BDI scores were not associated with expression of positive emotion at T2. Within each time point, the mother's and the child's positive expression toward each other were correlated; maternal COD status was positively correlated with child problem behavior.

### *Mother–Child Negative Affective Expression*

As shown in Figure 2b, mothers' negativity toward her child was stable over time, whereas child negativity was not. For both mothers' and children's expression of negativity, we found no partner effects—neither partner's negative expression at T1 was predictive of the other partner's negative expression at T2. Children's problem behavior at T1 was associated with the display of negative emotion at follow-up, such that children with higher levels of problem behavior were subsequently more negative toward their mothers. Contrary to what we had hypothesized, maternal history of COD was not associated with mothers' or children's negative emotion at either time. Maternal and child negative affective expression toward each other was only modestly correlated at each time point (at T1,  $p = .06$ ).

### *Maternal Responsiveness and Child Affective Expression*

To test associations between maternal responsiveness and children's expression of positive and negative emotion, we fit two models, controlling for T1 maternal current depressive symptoms (BDI) and child problem behavior. For child positive affective expression (see Figure 2c), no partner effect emerged. In this model, both maternal responsiveness

and child positive expression were modestly stable over time. Children who were high in problem behavior had a tendency to express less positive emotion toward their mothers at T2 ( $p = .07$ ). Child positive expression and maternal responsiveness were found to be positively correlated within each time point. Maternal BDI was not associated with mothers' responsiveness at T2, but there was a marginal concurrent correlation between the two at T1 ( $p = .07$ ), indicating a trend for more depressed mothers to be less responsive to their children's positive expression.

The final model examined relations between maternal responsiveness and child negative affective expression (see Figure 2d). Similar to the estimates in the previous models, mothers' responsiveness was modestly stable, whereas child negative affective expression was not stable over time. Higher levels of maternal responsiveness at T1 predicted lower rates of children's negative expression at T2. However, the partner effect of T1 child negative expression on T2 maternal responsiveness was not significant. Child problem behavior at T1 was positively associated with child negative expression at T2. In addition, child problem behavior was negatively associated with maternal responsiveness at T2—children's high behavior problems at T1 were predictive of lower maternal responsiveness at T2. Mothers' depressive symptoms were found to be negatively correlated with their responsiveness concurrently but not over time. Similar to the previous model, mothers who were more depressed tended to rate their children higher on problem behavior. Within each time point, maternal responsiveness and child negative affective expression were not correlated.

## Discussion

The present study, with an emphasis on socialization of emotion as a mutual enterprise, contributes to the understanding of the developmental processes of emotional exchange in mother–child dyads. As expected, we found stability, to some extent, in mothers' expression of positive and negative emotion and their responsiveness to offspring's positive emotion. Children were only stable in their expression of positive but not negative emotion. A source of discontinuity of children's negative emotion was maternal responsiveness—children whose mothers were responsive to their positive expression displayed decreased negative affective expression over time. With regard to the mutual influence within the dyads, mothers' positive expression and responsiveness were predictive of children's increased positive expression and decreased negative expression, respectively. However, child emotion was not associated with changes in maternal expression of emotion or responsiveness. In accordance with previous research (e.g., Downey & Coyne, 1990), we found that both maternal COD status and current depressive symptoms were associated with mothers' expression of emotion. However, neither COD status nor current symptoms were related to children's affective expression concurrently or longitudinally. Consistent with literature suggesting that children with internalizing and externalizing problems have difficulties in regulating negative

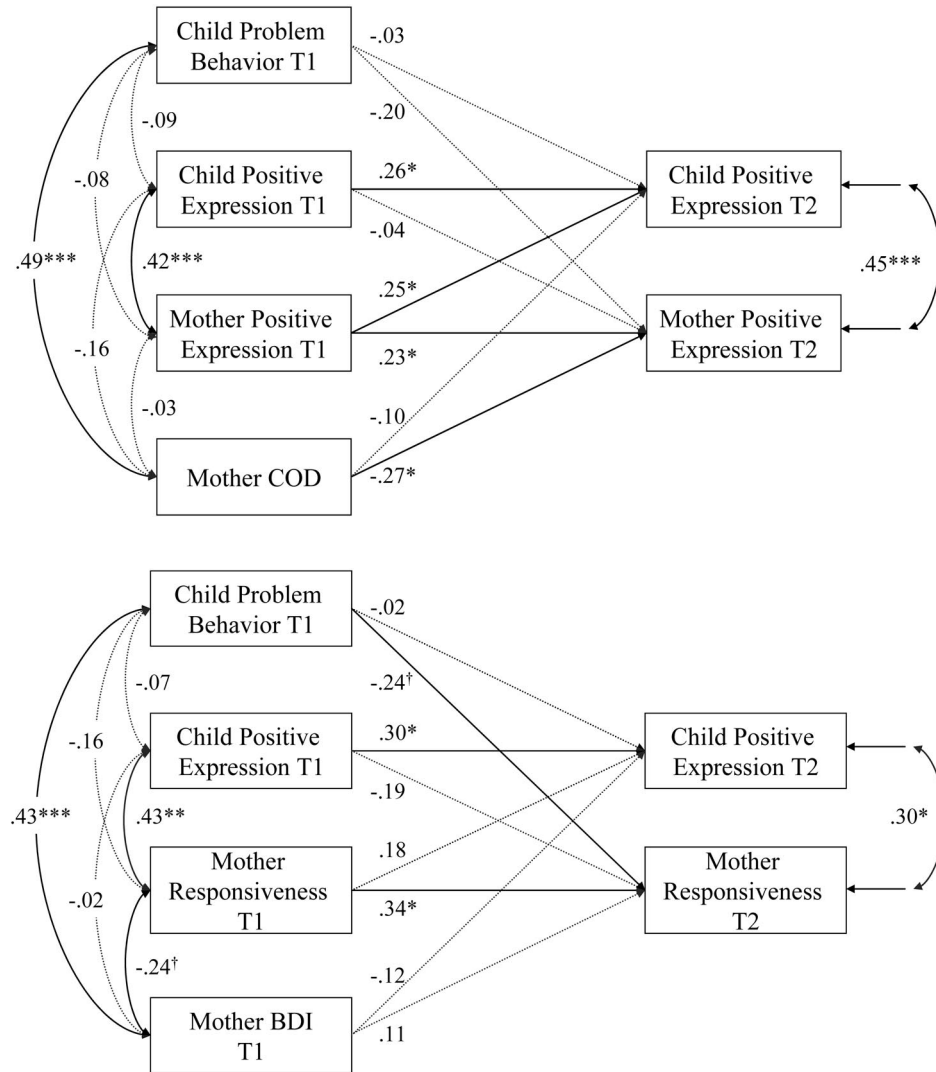


Figure 2. Path diagrams of estimated models with standardized path and correlation coefficients. Mother-child positive affective expression (top panel); mother-child negative affective expression (second panel); mother responsiveness and child positive affective expression (third panel); mother responsiveness and child negative affective expression (bottom panel). T1 = Time 1; COD = maternal child-onset depression; BDI = Beck Depression Inventory; T2 = Time 2. †  $p < .1$ . \*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$ .

emotion (e.g., Clark, Watson, & Mineka, 1994; Shaw et al., 1997), we found that a composite of externalizing and internalizing problems was associated with later expression of negative emotions.

#### Mutuality in Affective Expression in Mother-Child Dyads

Overall, mothers and children seemed to have a differential impact on the other's emotional expression, with mothers' affective expression appearing to play a more critical role on children's subsequent expression of emotion. Although we hypothesized that the influence of maternal and child affective expression would be bidirectional and that

both mothers' and children's expression of emotion would contribute to the emerging pattern of affective exchange within the dyads, our data suggest that the pattern of reciprocal influence over time was mostly parent driven. Theories of socialization emphasize the bidirectional nature of influence (e.g., Bell, 1968; Sameroff & Chandler, 1975); however, the relative roles of parents and children may change developmentally (Kochanska & Aksan, 2004). In early stages of development, when children are less competent in regulating their emotion, parents may play the primary role in emotion socialization.

The lack of direct association between children's ob-

(Figure continues)

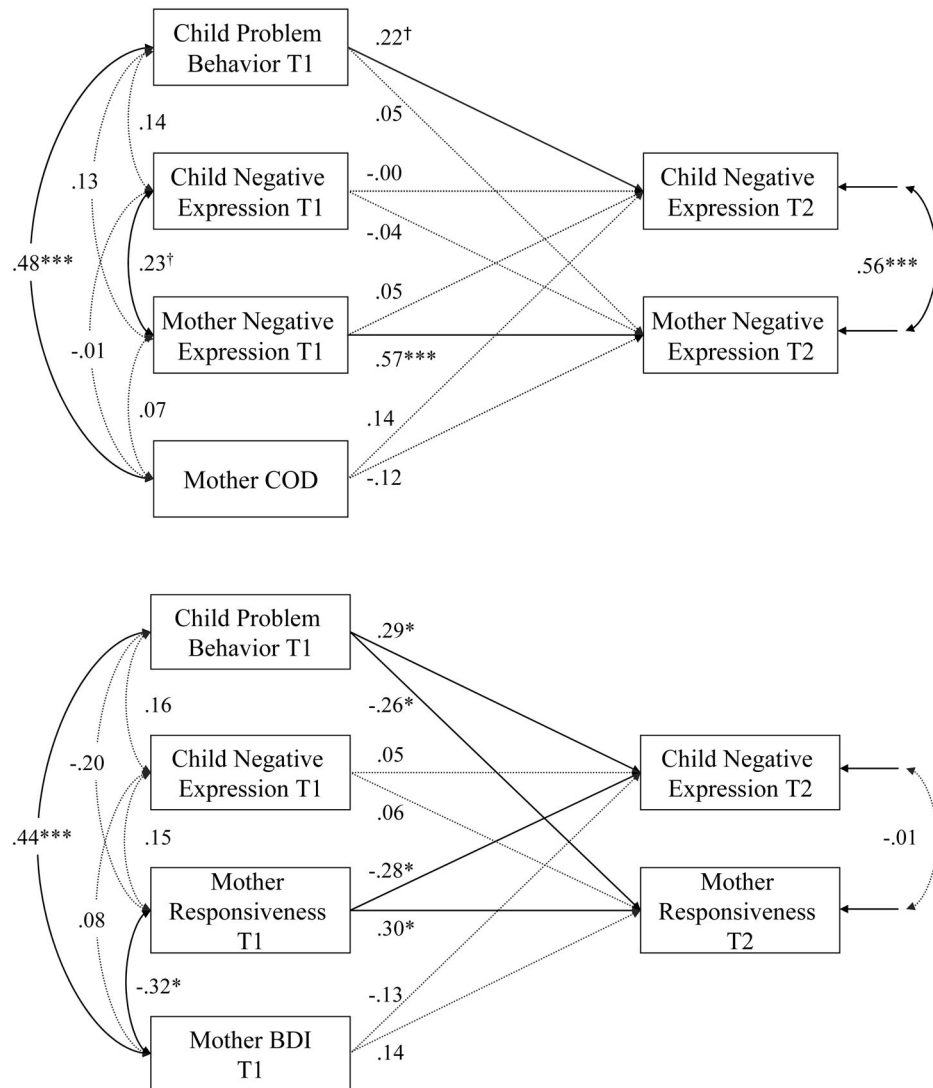


Figure 2 (continued)

served affective expression and maternal emotion at a later time cannot be interpreted as the absence of a child effect. We found that children's problem behavior was associated with reduced maternal responsiveness, which may suggest that although children's moment-to-moment affective expression was not predictive of mothers' later expression of emotion, children's characteristic ways of expressing and regulating emotion (particularly negative emotion) were associated with changes in the expression of mothers' emotions. Unlike the observed child affective expressions, child problem behavior was measured through maternal report; it cannot be determined whether differences in predictive validity were related to methodological rather than substantive issues. The results do suggest the importance of gaining parents' perspective on children's problem behavior in early childhood and how maternal perceptions of the child may affect later parenting behavior.

In contrast, although mothers' observed affective expression was found to predict children's later expression of emotion, maternal depression was not directly related to

children's affective expression. A possible explanation is that maternal depression may contribute to children's emotional problems or maladjustment through the impairment of mothers' own affective interaction patterns, such as reduced positive emotion and the lack of responsiveness to their children's emotion. Depressed mothers have been shown to display less positive affect toward their children and be less responsive to their children's emotional state than nondepressed mothers (e.g., Hops et al., 1987; Shaw et al., 2006). The present study further corroborates the linkage between mothers' lack of positive emotion and responsiveness and children's reduced positive emotion and increased negative emotion over time. Findings of this study also are consistent with the notion that maternal responsiveness may mediate the effect of maternal depressive symptoms on child negative emotion, as mothers' depressive symptoms were found to be associated concurrently with their responsiveness, which, in turn, were associated with

later decreases in child expressions of negative emotion. Future research focusing on the potential mediating roles of maternal expression of emotion and maternal responsiveness to children's emotion in relation to maternal depression and child maladjustment is needed to further researchers' understanding of the mechanisms involved in the interpersonal transmission of emotional problems and depression.

### *General Maternal Positivity Versus Responsiveness to Child Positive Affect*

In the present study, we attempted to differentiate between two dimensions of positive parenting in emotion socialization: general positivity toward the child and responsiveness to child positivity. To a certain extent, we did find separate links between these two dimensions of positive socialization to children's affective expression. Mothers' overall positivity was found to predict children's later general positivity toward mothers. It is interesting to note that maternal responsiveness to child positivity was not predictive of later child positive affective expression. These findings may suggest that for children to develop effective regulation of positive emotion, parents need to frequently engage them in positive affective exchange and provide them with ample opportunities to learn appropriate regulation through modeling and positive feedback (Davidov & Grusec, 2006). This is also congruent with studies suggesting shared family influence for positive affect and approach (e.g., Goldsmith, Buss, & Lemery, 1997; Plomin et al., 1993). An alternative explanation for the association between maternal and child general positivity is the heritability of positive emotionality. Several behavioral genetic studies have established heritability for the personality of positive emotionality (e.g., Goldsmith et al., 1997; Tellegen, Lykken, Bouchard, & Wilcox, 1988).

Maternal positivity and responsiveness were also differentially associated with children's expression of negative emotion. As expected, maternal responsiveness to children's positive affect was predictive of children's reduced negative emotion over time. Maternal general positivity, however, was not related to children's later expression of negative affect. Past research has found that parents' responsiveness to distress was positively related to more effective regulation of negative emotion (Davidov & Grusec, 2006). Although parental responsiveness to child distress plays a significant role in socialization, it only accounts for part of the emotional cues children direct to parents. Kochanska and Aksan (2004) pointed out that parents' responsiveness to different types of child emotion may have varying consequences for children. This study adds to the existing knowledge by identifying a link between maternal responsiveness to child positive affect and the change in children's expression of negative emotion. More research is needed to understand the function and consequences of parental responsiveness to specific types of child emotion.

### *Maternal History of COD Versus Current Depressive Symptoms*

Although we did not explicitly test differences between maternal COD status and current depressive symptoms in their association with maternal and child affective expression, different patterns emerged. Whereas mothers' depressive symptoms tended to be associated with their responsiveness to children's positive emotion concurrently, maternal COD was associated with lower overall positive expression toward children longitudinally. Many studies of parenting behavior in currently depressed parents have reported a link between maternal depression and low responsiveness (e.g., Cohn & Tronick, 1987; Hops et al., 1987), presumably due to depressed mothers' low sensitivity to children's emotional cues. Although the link between maternal depression and reduced overall positivity toward offspring has been supported by many previous studies (Goodman & Gotlib, 1999), the findings of this study suggest more specifically that mothers with a history of COD tend to display less positive expression toward their children than NCOD mothers. This finding is congruent with studies suggesting that maternal COD may contribute to the negative parent-child interaction above and beyond current depressive symptoms because of earlier and more chronic disruptions in the socialization process (Kovacs & Goldston, 1991; Silk et al., 2006). Our findings suggest that research on maternal depression and parenting may benefit from examining different aspects of maternal depression such as time of onset, chronicity, and current symptoms, as each may be differentially associated with parental behavior and, in turn, with children's affective regulation.

### Limitations

Several methodological limitations need to be addressed. First, although the laboratory procedure included several tasks for inducing different types of emotion in mothers and children, and we were largely successful in eliciting both positive and negative emotion in children (Shaw et al., 2006), it was more challenging to elicit negative emotion in mothers. The lack of association between maternal negative emotion and child affective expression may be partially due to the restricted variability in mothers' expression of negative emotion. Second, negative emotion was broadly defined in this study due to the difficulty in eliciting it. Future studies should attempt to use more narrowly defined types of negative emotion in examining its patterns of exchange in mother-child dyads (e.g., anger, sadness). Third, both maternal depressive symptoms and child problem behavior were based solely on maternal reports. Therefore, the relation between these two variables may be inflated due to the shared informant and method variance. Also related to the shared method variance issue, the coding of the emotional expressions of each mother-child dyad was carried out by the same coder, which may inflate the correlations between maternal and child emotional expression within the same time point. Fourth, the sample size is relatively small, particularly with the analyses in which each relationship was

estimated controlling for all other relationships. A small sample size limits the likelihood for relationships of smaller magnitude to be detected. Additionally, we included siblings from the same family. Although we took precautions with the analyses, it would be preferable to include only one child from each family to ensure that the assumption of independence is not violated.

In summary, this study included a sample of mothers, approximately one half of whom had a history of COD, to advance researchers' understanding of the mutual emotional socialization process. We adopted an approach that takes into account bidirectional processes in parent-child emotional exchange and showed that parents' expression of positive emotion and responsiveness were predictive of children's subsequent expression of emotion. We found evidence suggesting differential consequences of parents' general positivity and responsiveness to child positive emotion and that mothers' history of COD and current depressive symptoms may have different effects on their affective behavior with offspring. If corroborated with other samples of at-risk children, the present findings could serve as the building blocks for prevention and intervention studies designed to target specific parenting behaviors that promote child adaptation.

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