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Mother–toddler interaction patterns associated with maternal depression

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Abstract
Interactive coordination was observed in laboratory play interactions of pairs of 29 clinically depressed and 14 nondepressed mothers and their 13–29-month-old children ($M = 18.9$ months). Nondepressed mothers and their children displayed more interactive coordination than depressed-mother dyads ($p < .001$). Depressed mothers were less likely to repair interrupted interactions, and their toddlers were less likely to maintain interactions than nondepressed controls. Toddlers matched their nondepressed but not their depressed mothers' negative behavior rates. Results suggested that early interventions focus on training mothers to attend to, maintain, and repair mother–child interactions to more closely approximate normal levels of interactive coordination.

Adaptive success in infancy requires development of the baby's ability to coordinate activities in the social and physical environment while maintaining affective equilibrium (Tronick & Cohn, 1989). In normal social development, infants are helped by their mothers to develop effective strategies to coordinate their actions with those of interactional partners in a mutually satisfying manner. Tronick (1986) described interactions as coordinated when participants achieve a joint focus of attention on a mutual goal over a majority of the interaction period. Coordination may be accomplished by maintaining the interaction over an extended period of time with few breaks in the joint focus, or by quick and efficient repairs of breaks as they occur (Cohn & Tronick, 1988; Gianino & Tronick, 1988). Interactive coordination refers to participants' continuous adjustment of interpersonal and object-related behaviors to reach mutually acceptable goals. This ability to participate effectively in joint goal-directed partnerships may be related to secure attachment in the toddler years (Crittenden, 1992).

A major question is whether children who are at risk for psychopathology display early problems in interactive coordination and other aspects of dyadic interaction. If high risk infants display characteristic and problematic interactions, then it may prove possible to develop specific interventions to improve their social skills that form a basis for their future social functioning. A necessary first step is to identify groups of infants who have a heightened probability of developing adjustment problems (such as infants of depressed parents) and then to examine closely the nature of their interactions with important others, particularly their mothers. This study focuses on the earliest portion of this proposed chain, that is, whether depressed mothers and their toddlers display less desirable interactive be-

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haviors (lower levels of coordination, maintenance, and repair of interactions and more negative interactions) than a nonclinical group.

This study relates to several major themes of developmental psychopathology, including an interest in both the normal unfolding of skills in dyadic functioning and in deviations from the norm. Specifically, we aim to explore several aspects of the behavioral similarities and differences between clinically depressed and nondepressed mothers and their young children and to study toddlers' accomplishment of developmentally appropriate tasks, including the ability to achieve and maintain or repair a common interactional focus with the mother. We assume that the toddler's attainment of these developmental landmarks forms a solid foundation for later continued healthy social functioning.

The mother–infant relationship constitutes the major social environment of early life for most children. As yet, little is known about the particular mother–child interaction patterns that may place children of depressed mothers at risk of developing later maladjustment, but the preoccupation, unavailability, and irritability that often accompany depression can be expected to affect children negatively, possibly leading to child maladjustment. As a growing research literature reports, depressed mothers evidence behavioral characteristics that are inconsistent with the sensitive, warm, responsive style that typifies good mothering (Ainsworth, Blehar, Waters, & Wall, 1978). Although there are large individual differences in their parenting competence, depressed mothers as a group have been characterized as withdrawn, hostile, intrusive, insensitive, coercive, and unresponsive in their interactions with their children (Downey & Coyne, 1990; Field, 1992; Gelfand & Teti, 1990; Goodman & Brumley, 1990; Kochanska, Kuczynski, Radke–Yarrow, & Welch, 1987; Teti & Gelfand, 1991).

Many descriptions of the interactions of depressed mothers and their children take the form of raters' global impressions. Although informative, such global descriptions provide limited information on the particular interactional patterns that may be problematic and require modification. To formulate early intervention programs, preventionists require more precise descriptions of dysfunctional parent–child interchanges. The present study aimed to identify the types of interactions that distinguish depressed from nondepressed mother–child interactions, with a longer range goal of providing information useful in early intervention programs. In particular, we examined interactive coordination and related interaction patterns such as negative exchanges and repairs of interrupted interactions as possible characteristics that distinguish normal mother–infant interactions from those involving a depressed mother.

Interactive Coordination

Interactive coordination is a potentially useful variable because it shows clear developmental trends, describes the behavior of caretakers as well as children, and may indicate abnormalities in caretaker–child interactions. Total proportion of dyadic interactive coordination increases with child age during the first year (Cohn & Tronick, 1987). The interactions of 3–6-month-old infants and their mothers are coordinated for approximately 30–40% of interaction periods (Tronick & Cohn, 1989). By the time the infant is 11 months old, the proportion increases to around 65% (Field & Pawlby, 1980; McCabe & Uzgiris, 1983). Further, controlling for child age, higher proportions of coordinated interactions are related to higher ratings of maternal sensitivity (Raver & Leadbeater, 1992). Thus, problems in the mother–child relationship, and possibly in the child's socioemotional development, may be expected when children display unusually low rates of coordinated interactions. However, under some circumstances, moderate rather than high levels of coordination have been found to relate to better infant adjustment (Belsky, Rovine, & Taylor, 1984), suggesting some optimal range of coordinated interactions. This study investigates the type of relationship, if any, between interactive coordination and maternal depression. Two features of coordinated interactions were examined: the dyad's total proportion of coordinated activity and the roles played by each participant in breaking, continuing, or resum-

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ing the interaction. Thus the measures included in this study revealed each interactant's role in producing or disrupting the flow of the shared activity.

Parent and child may play specific roles in engaging and disengaging their joint coordinated attention. Mothers appear to be primarily responsible for initiating coordinated interactions and providing a social framework or scaffolding for interactions with infants (Rocissano, Slade, & Lynch, 1987). Interaction sequences between mothers and infants typically involve the infant's looking at the mother, followed by the mother's positive eliciting behaviors (e.g., speaking to the infant), and then by her infant's positive response (Tronick & Cohn, 1989). With increasing age, the child becomes more active in initiating the topic or object of attention (Eckerman & Didow, 1989). After the infant is 9 months old, interactions more often begin with the infant looking at objects than at the mother. The mother joins the older infant's focus on an object, then behaves positively, following which the infant attends to the mother (Cohn & Tronick, 1987). The first step in disengagement from the coordinated interaction is more often taken by the infant, followed by the mother, who may then repair the interaction with another social bid. Interactions are maintained when mothers follow their child's lead in changing the topic, so a potential break in interaction simply becomes a coordinated change of focus. Rocissano and colleagues (1987) found that, in a nondepressed sample, mothers who frequently followed their toddlers' initiatives and repaired the interaction elicited fewer negative responses from their toddlers than mothers who engaged in fewer repairs. These responsive mothers were also rated as more sensitive than were mothers who less often followed their toddlers' lead in changing the pair's attentional focus.

Interactive coordination has not yet been clearly related to any other measure of infant adaptation, but such a link seems plausible. In general, reciprocal relations are correlated with child compliance, particularly when the caregiver displays warmth and support and allows the child some degree of control in the interaction (Parpal & Maccoby, 1985; Rocissano et al., 1987). The caregiver's ability to redirect the infant's goal-directed behaviors in a skillful fashion may support the infant's mastery motivation, social relatedness, and promote a positive emotional state. Thus, we predicted that mothers who are alert and responsive to their children's goals and who frequently repair breaks in shared attention should have more cooperative and compliant children.

Maternal Mood Disorder and Child Adjustment

An extensive literature links maternal depression to heightened risk of children's cognitive and emotional disorganization, interpersonal defensiveness, and hypersensitivity to social cues. As a group, children of depressed mothers are described as noncompliant, withdrawn, aggressive, and insecurely attached (Harnish, Dodge, Valente, & Conduct Problems Prevention Research Group, 1995; Hops, Biglan, Sherman, Arthur, Friedman, & Osteen, 1987; Lyons–Ruth, Connell, Grunebaum, and Botein, 1990; Radke–Yarrow, Cummings, Kuczynski, & Chapman, 1985; Teti, Gelfand, Messinger, & Isabella, 1995). Parenting style is often invoked to explain these dysfunctions (Dodge, 1990; Field, 1992; Goodman & Brumley, 1990), but the specific mechanism is largely a matter of conjecture. The young children of depressed mothers may be placed at an immediate and potentially enduring disadvantage by their mothers' unavailability (Cummings & Cicchetti, 1990; Field, 1989). Alternatively, some children of depressed mothers may have a hereditary propensity to develop mood and other disorders through as yet unidentified genetic mechanisms. Children may also acquire dysfunctional behaviors by (a) imitating the mother's dysphoric behavior (Field, 1984), (b) developing complementary patterns of responding such as becoming demanding in response to maternal passivity (Coyne, Birchall, & Stiles, 1991), or (c) becoming confused by their mothers' inconsistent responsiveness (Zahn–Waxler, Cummings, Iannotti, & Radke–Yarrow, 1984). It is difficult to identify a single cause or group

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of causal factors responsible for these children's heightened adjustment risk because depressed parents and their families typically experience so many different types of problems simultaneously, including chaotic living conditions, heightened financial stress, physical health difficulties, marital problems, and lack of social support (Downey & Coyne, 1990; George, Jameson, Gelfand, Altman, & Teti, 1996). This study does not attempt to single out any predominant psychopathological agent from among the many stressors that typically beset depressed mothers and their children. Whatever their source, dysfunctional interaction styles established in infancy may prove enduring and may dispose children to future social maladjustment.

Predictions

This study tested several hypotheses about specific aspects of the quantity and quality of interaction between depressed mothers and their toddlers. Predictions were drawn from the work of Tronick and associates (Tronick, 1989; Tronick & Cohn, 1989) on interactive coordination combined with the previously cited research literature demonstrating impaired parenting among depressed women. Specifically, we predicted that (a) both individually and as a pair, depressed mothers and their toddlers should exhibit less interactive coordination than nondepressed mothers and their toddlers; and (b) depressed mothers and their toddlers should each display more negative interactions, fewer maintained interactions, and fewer repairs of interrupted interactions than nondepressed mothers and their toddlers respectively; and finally, (c) toddlers of depressed mothers should be less compliant in response to maternal directives than toddlers of affectively normal mothers.

Method

Sample

Forty-three mother–toddler dyads (29 pairs with a depressed mother and 14 with a nondepressed mother[1]) were selected from a larger sample of families participating in a longitudinal study of the effects of clinical depression on parenting and child development. Selection criteria for the present study restricted the toddlers' age range ($M = 18.45$ months, range = 13–29 months), and equated groups on child gender (21 were male, 50% in the nondepressed and 51.7% in the depressed group), family income (median = $22,000), mother's level of education (84% had some postsecondary training), and mother's marital status (91.5% were married). This balancing procedure limited the *N*, but was designed to reduce the impact of possible confounding variables. As a result, the nondepressed and depressed groups did not differ significantly on family income, mothers' level of education, race (all Caucasian in both groups), mean toddler age, or marital status. All families resided in urban or suburban neighborhoods.

The depressed women were referred to the project by their therapists who had previously provided a DSM-III or DSM-III-R diagnosis of major depression, dysthymic disorder, or adjustment disorder with depression for each referral (see Teti et al., 1995, for a more complete description of participant characteristics). SADS-L semistructured interviews utilizing Research Diagnostic Criteria for Diagnosis (Endicott & Spitzer, 1978) administered blindly to the sample from which the present participants were drawn confirmed that all of the depressed group had a lifetime diagnosis of mood disorder with at least one episode of major depression (Gelfand, Teti, Seiner, & Jameson, 1996). Women with a known bipolar disorder, active substance abuse, or personality disorder were excluded.

Because the depressed mothers had received formal DSM depressive diagnoses and

1. The group of 29 depressed mothers contained 14 who were receiving a 29-visit, home-based intervention and 15 who were not. Both groups continued to receive their usual mental health care. Although the depressed-intervention mothers performed slightly better than the depressed controls in their interaction with their toddlers, the difference was not significant, so these groups were combined for the purpose of this study.

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had sought treatment for their affective disorders, no minimum score on the Beck Depression Inventory (BDI; Beck, Ward, Mendelson, Moch, & Erbaugh, 1961) was required for their participation, but mothers who were considered nondepressed were required to have BDI scores lower than 9. The clinical sample could best be described as moderately to severely depressed when first evaluated approximately 1 year before the current assessment. Forty-seven percent were taking prescribed antidepressant or other psychoactive medication, and 85% reported at least one previous depressive episode with a mean length of 9.43 months. At the time they entered this study (and their infants were 3–13 months old), their current episode averaged 8.10 months. Mean BDI scores obtained on the day their interactions for this study were videotaped were 25.79 for the depressed mothers and 7.14 for the nondepressed mothers ($F(1, 41) = 14.68$, $p < .001$), confirming the groups' depressed or nondepressed status, respectively.

Procedures

Demographic information was obtained during home visits by female examiners who were blind to each mother's depressed or nondepressed status. Within a two-week period, each mother–toddler dyad also participated in a videotaped session in a university laboratory playroom containing two chairs, a video camera and observers behind a one-way window, and several developmentally appropriate toys. Each dyad completed three tasks in the following order: a 15-min warm-up free play segment, a 10-min mother–toddler interaction segment which provided the observational data for this study, and the standard Strange Situation task for assessing attachment security (Ainsworth, Blehar, Waters, & Wall, 1978).

Dyadic interaction observations. Following the warm-up free play period, the previously used toys were quietly removed and the mother was told to play with her toddler using two new toys: a ring-stacking toy and a shape-sorting puzzle box. The mother was told to select one of the two toys and involve her child with that toy until signaled to introduce the other about 3½ min later. Each videotape of a mother–toddler interaction with the two toys was transcribed by one of four individuals, all of whom were blind to maternal diagnosis. Although transcript accuracy was not assessed formally, the possibility of transcriber bias was reduced through the use of four transcribers who were "blinded" or unaware of each participant's psychiatric status, each of whom produced a portion of the data for coding. Next, two additional, blinded raters of the specific mother and child behaviors used both the transcriptions and the original videotapes as a basis for their ratings, thus enabling them to notice and correct mistakes in segmenting the videotaping interactions into Turns. (In fact, no such mistakes were found.)

The first set of four transcribers each segmented a portion of the videotaped mother–child interaction into Turns and prepared a written narrative description of each Turn. Following the coding procedure developed by Rocissano et al. (1987), a Turn consisted of a period of indefinite length in which either the mother or the toddler dominated the ongoing activity. A Turn completion was defined as "a pronounced pause in which the partner might or might not take the floor" (Rocissano et al., 1987, p. 700). The Turn terminated when the activity was completed, there was a pause (1 s or more), or the other person interrupted the activity. Turn completion sometimes included cues such as looking away or verbally indicating a change of focus. A Turn was coded when there was such a social cue, the partner interrupted, or there was a pause of 1 s or more, allowing sufficient time for a response to occur (Rocissano et al., 1987).

Each of the interactive segments began with the mother's attempt to engage her toddler with the new toy, which constituted Turn 1 for every dyad, and continued from there. For example, one mother selected the shape-sorting box, emptied it, and set it on the floor (Mother Turn 1). The toddler selected a block and looked at the box (Toddler Turn 1). The mother rotated the box until the shape of the hole on top matched the shape of the block

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held by the toddler, saying "Put it in here." (Mother Turn 2). The toddler glanced at the mother, then tried to put the block through the hole (Toddler Turn 2). Mother: "Turn it this way." (Mother Turn 3). Toddler dropped the block and turned to play with another toy (Toddler Turn 3). Mother: "No! Come here now!" (Mother Turn 4). The toddler continued playing with the other toy (Toddler Turn 4). The mother banged the block against the box and said "Lookee here, princess." (Mother Turn 5).

To check the accuracy of Turn segmentation, one investigator and one independent judge each coded the Turns in the first half of five randomly selected videotaped mother–child interactions. Agreement between the independent judges was defined by identification of a segment in the behavior stream that both transcribers considered to be either a child or mother Turn. The mean proportion of agreement between the independent judges was .86 (proportion of agreement = number of agreements/number of agreements + disagreements); the range was .79–.93 for the separate mother–child dyads.

Two coders, who were also blind to maternal diagnosis and child attachment classification, coded the transcripts while watching the videotape. Each coder rated the mother's and child's behavior during each Turn using a system adapted from Rocissano et al. (1987). Coding categories included Interactive Coordination (matching the other's social and object-related goal), Negative (protesting or controlling, avoiding, or humiliating the other), Uninvolved (pursuing a solo activity), and Direct (changing the other's goal without considering the other's viewpoint). Direct was coded only for the mother in order to assess child compliance. The Appendix presents the definitions of the codes. Overall interrater agreement on coding was satisfactory. The mean κ for coding of mothers' behaviors was .92, and the mean κ for coding of child behaviors was .78. Percent agreement for individual behavior categories is shown in the Appendix. Most dyads had a total of 4–10 Turns, 2–5 each for mother and toddler, per 15-s interval ($M = 3.22$, $s = 0.54$). The depressed and nondepressed groups did not differ in mean number of Turns per interval, $F(1, 40) = .0027$, $p > .05$.

All coded Turns were summarized in terms of the proportion of separate mother and toddler Turns coded as Interactive Coordination (IC), Negative, Direct, and Uninvolved. The proportion of IC was not necessarily equal for a mother and her toddler. If one member of the dyad assumed primary responsibility for maintaining and repairing the coordinated interchange, that member's proportion of Interactive Coordination would be higher than that of the partner.

Four additional conditional probability categories, Maintain, Repair, Direct, and Comply (see Appendix), were included to provide additional information on the child's and mother's particular contribution to the continuity or discontinuity of the interaction. Each of these codes used the previously described categories (i.e., IC, Uninvolved, Negative) to identify a particular turn–exchange sequence. For example, Repair is the proportion of Turns in which one member of the dyad is engaged in a solo activity (Uninvolved) and the second member changes focus to match the activity of the first. In contrast, Maintain describes the proportion of Turn exchanges in which one partner's IC is followed by IC by the other. In Comply, which is scored for the child only, a maternal Direct is followed by child Interactive Coordination. Direct describes one partner's active or forceful bid to persuade an uninvolved partner to change focus. Repair accomplishes the same goal, but in a subtler, less coercive manner. Thus, each of these codes (Maintain, Repair, Direct, and Comply) is based on the conditional probability of an interactant's particular behavior given the partner's behavior during the immediately preceding Turn.

Results

Group differences in interactive coordination

The predicted group differences in Interactive Coordination between dyads with a depressed or nondepressed mother were tested using one-way analyses of covariance (ANCOVAs) controlling for toddler age. Toddler age was

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Table 1. *Mean proportions of mother and toddler interactive behavior in depressed and nondepressed groups*

	Depressed ($n = 29$)		Nondepressed ($n = 14$)	
Behavior	*M*	*SD*	*M*	*SD*
Interactive coordination				
Mothers*	.52	.21	.66	.11
Toddlers**	.47	.22	.56	.11
Negative				
Mothers	.04	.05	.05	.11
Toddlers	.07	.05	.06	.10
Maintain				
Mothers	.67	.20	.77	.11
Toddlers**	.53	.21	.70	.12
Direct				
Mothers	.50	.15	.51	.11
Toddlers	.10	.07	.13	.11
Repair				
Mothers*	.37	.22	.51	.16
Toddlers	.34	.17	.44	.16
Comply (toddlers only)				
Toddlers	.52	.18	.57	.15

*$p < .05$; **$p < .001$.

used as the covariate because it was positively correlated with Interactive Coordination ($r(41) = .51$, $p < .01$). Toddler gender was unrelated to any behavioral measure, so the data for the girls and boys were combined in the analyses. As predicted, there was a significantly lower mean proportion of Interactive Coordination for the depressed mothers ($F(1, 40) = 5.56$, $p < .02$) and their toddlers ($F(1, 40) = 7.96$, $p < .001$) than for their nondepressed counterparts (see Table 1).

Separate oneway ANCOVAs controlling for toddler age were then performed comparing depressed and nondepressed groups for proportion of Turns coded as Negative, Direct, Maintain (the inverse of a break, so break was not scored separately), Repair, and Child Comply. For Maintain, toddlers of depressed mothers were significantly less likely to maintain interactions as compared with the toddlers of nondepressed mothers ($F(1, 40) = 11.06$, $p < .001$). Similarly, depressed mothers were marginally less likely to maintain interactions ($F(1, 40) = 3.39$, $p = .07$), and were significantly less likely than nondepressed mothers to attempt a repair of a disrupted interaction ($F(1, 40) = 4.25$, $p = .04$; see Table 1). Thus the depressed dyads had lower levels of Interactive Coordination because the toddlers were more likely to withdraw from interactions, and their mothers were less likely to attempt to reengage them. There were no significant group differences in the mean proportion of Turns coded as Negative, Directive, or Child Compliance. Nevertheless, in absolute terms, the nondepressed-mother dyads consistently performed more of all the behaviors that create and maintain interactions.

Relationship between mother and toddler behaviors

Partial correlations controlling for toddler age were calculated to describe the relationship between mother and toddler behavior in the depressed and nondepressed groups, as shown in Table 2. The resulting correlation matrix presents correlations between mother and child behaviors within the depressed and nondepressed groups, with toddler age partialed out. Some significant relationships emerged for both groups, others for the depressed (D) group only, and some only for the nondepressed (ND) group: (a) mother and child Repairs were correlated for both D and ND groups. In fact, Repair was the only interactive behavior that yielded the same correlational pattern between mothers and children for both D and ND groups; (b) for the D group only, there was a positive correlation between mothers and children for both IC and Maintain, and child compliance correlated with mother Maintain and Repair rates; and (c) for the ND group only, mother and child Negative behaviors were strongly and positively correlated, and the toddlers became significantly more directive when the mothers' rates of Maintain were low, which was not true of the D group.

Next, *r* to *z* transformations of these correlations were used to test the differences between correlations of mother and toddler behaviors in D and ND groups. The D versus ND group differences were examined for all possible correlations between the observed

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Table 2. *Partial correlations* (*controlling for toddler age*) *between mean proportion per session of specific mother and toddler interactional behaviors and z scores for differences between depressed and nondepressed dyads*

Mother Behavior	Toddler Behavior																	
	Int. Coord.			Maintain			Repair			Negative			Comply			Directs		
	D	ND	*Z* Diff.	D	ND	*Z* Diff.	D	ND	*Z* Diff.	D	ND	*Z* Diff.	D	ND	*Z* Diff.	D	ND	*Z* Diff.
Int. Coord.	.75**	.37	1.63	.53**	–.16	*2.09*	.70**	.61*	0.44	–.51*	–.08	–1.79	.08	.30	–0.59	–.04	–.26	0.59
Maintain	.44*	.12	0.98	.41*	.11	0.91	.47*	.21	0.83	–.39	–.05	1.01	.61*	.00	1.82	.09	–.62**	*2.10*
Repair	.62**	.34	1.03	.36	–.34	*2.03*	.62**	.65*	–.14	–.47*	–.05	–1.44	.55*	.39	0.54	–.17	.03	–0.51
Negative	–.08	–.63*	1.84	.04	–.81**	*3.24*	.09	.19	0.34	.23	.93**	*–3.96*	–.03	–.42	1.07	–.01	–.32	–0.82
Directs	.32	.33	–0.03	.11	.44	1.01	.20	.17	1.04	–.19	–.48	0.92	–.01	.25	–0.70	.03	.06	0.08

Note: D, depressed mother–toddler pairs ($n = 29$); ND, nondepressed mother–toddler pairs ($n = 14$).
*$p < .05$, indicated for z scores by italics; **$p < .01$.

mother and child behaviors. As Table 2 indicates, the following significant group differences emerged:

1. As compared to the ND dyads, there was a higher positive correlation between the depressed mothers' Interactive Coordination and their children's Maintain (r = .53 and –.16, respectively, $z = 2.09$, $p < .05$).

2. ND mothers and toddlers showed highly correlated Negative behavior ($r = .93$), while depressed mother and child Negatives were not significantly correlated (r = .23, $z = -3.96$, $p < .05$). The ND group partners matched each other's Negativity only.

3. Maternal Repair correlated positively with child Maintain in D dyads ($r = .36$) but correlated negatively to child Maintain in well dyads ($r = -.34$, $z = 2.03$, $p < .05$).

4. ND mothers behaved negatively when their children showed low rates of Maintain, where these same mother and child behaviors were unrelated within the D group ($z = 3.24$, $p < .05$). A difference approaching significance was found between the positive correlation of ND mothers' Negative behavior and children's Interactive Coordination and the lack of such a correlation in the D group ($z = 1.84$, $p = .066$).

5. ND mother pairs displayed higher rates of toddler Directs when mothers' rates of Maintain were low ($z = 2.10$, $p < .01$), but D pairs did not. Thus, although the depressed and nondepressed mothers and their children resembled each other in several ways, each group displayed several unique patterns of interaction.

Discussion

This study described several potentially important features of mother–toddler interaction patterns that distinguish dyads containing a depressed mother from those containing a nondepressed mother. As predicted, more of the nondepressed mothers and their children interacted skillfully, maintaining high rates of Interactive Coordination, while depressed mothers and toddlers displayed less prolonged, less well integrated and synchronous interactions. New information was uncovered concerning specific aspects of depressed mothers' and their children's respective roles in their poorly integrated interactions and how this group compared with a better adjusted group.

The nondepressed mothers more often repaired interrupted interactions when their toddlers initiated new activities and their toddlers were more likely to maintain than to break ongoing exchanges. The play interactions of the affectively well mothers and their youngsters were prolonged and cooperative, with mother and child taking turns in working together on a common social or object-related goal. This harmony did not stem from the toddlers' greater compliance or lesser negativism, or from group differences in the mothers' directiveness with her child. Rather, the nondepressed mothers more frequently adjusted their own goals to match a change in their child's activities, as indicated in their higher rate of Repairs (a child's discontinuing the interaction and the mother's accommodating to the child's new focus). That is, the nondepressed mothers more often noticed when their child's attentional focus had shifted, and quickly accommodated to the child's new interest, thereby creating a new mutual goal. Mothers with a higher Repair rate thus allowed their toddlers greater autonomy in directing their joint activity, which may give young children a greater sense of control and executive function. Such advances in individual autonomy may be developmentally important in the second and third years of life (Belsky, Woodworth, & Crnic, 1996). In contrast, the coming together of depressed mothers and toddlers was briefer and punctuated by each partner's periodic withdrawal into separate activities.

There are several possible sources of the relationship between maternal depression and low maternal Repair rate. Repair is a complex process requiring a number of cognitive and behavioral skills and activities. First, a mother must be alert to subtle changes in her child's attentional focus, motivational state, and goals. This social alertness is difficult for depressed mothers who are often fatigued, preoccupied with their dysphoria, and therefore less alert to cues from their children's behavior than well mothers (Fox & Gelfand, 1994).

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Second, because they are less sensitive and more intrusive than nondepressed mothers, mood disordered mothers may lack the flexibility and parenting self-efficacy to adjust to the child's newly adopted goal (Field, 1992; Teti & Gelfand, 1991). Third, the mother's interpretation of the child's motivation for discontinuing a joint activity could play a role in her reaction. Once the mother has noticed a change in her child's involvement in their interaction, she may react in various ways. She can change her own agenda and encourage the new behavior (Repair), continue her own activity, or Direct her child's activity. Alternatively, she can withdraw from the interaction and become Uninvolved, because she does not consider it an important matter, because repairing requires too much energy and investment, or because she interprets the change in the child's interest as a personal rejection. Depressed mood can lead caregivers to interpret children's withdrawal from a joint activity negatively and withdraw or react in kind (Fox & Gelfand, 1994).

It is important to note that mothers and children reliably matched each other's Repair rates regardless of the mothers' psychiatric status. The depressed mothers accomplished fewer Repairs, but their rates were as predictive of their children's Repairs as were those of the well mothers. The depressed mothers' low Repair rates suggest the utility of an early intervention for them and their infants aimed to teach depressed mothers to employ Repairs more often. Alerting a mother to the importance of a higher maternal Repair rate would promote the mother's vigilance and sensitivity to her infant's behavior and encourage the child's initiative in exploring objects and activities, both of which are problematic in depressed mother–infant interactions. In addition, children of depressed mothers would be spared the frustration of being thwarted by their mothers when they attempt to initiate a new joint activity.

For their part, the toddlers of the nondepressed mothers were more successful at maintaining Interactive Coordination with their mothers during play sessions than were children of depressed mothers. Children of nondepressed mothers not only matched their mothers' immediately preceding social and object-related goals (coded as toddler Maintain), but they also persevered longer in joint play tasks with their mothers (toddler Interactive Coordination). Their extended attention to a shared activity maximizes the probability that these children will succeed in accomplishing their play goals in an enjoyable relational context. Such early interactional skills may give these youngsters a social advantage as they enter group child care and nursery school.

Unlike the D group, the toddlers of affectively well mothers displayed higher rates of Direct when their mothers' rates of Maintain were low. This could be interpreted as either the well mothers' withdrawal in the face of aversive toddler directives and demands or as toddlers' attempts to command the attention of their temporarily inattentive mothers. In contrast, toddlers of depressed mothers did not become more directive as their mothers failed to maintain the interaction, which could suggest that the toddlers found their depressed mothers' breaks of their interaction unpredictable or uncontrollable. The mothers' Directs were unrelated to any toddler behavior for either the D or ND group.

The D and ND groups did not differ in rates of Negative behavior although they displayed different patterns of mother–child negativity. Negativity rates were highly positively correlated for the well mothers and their children ($r = .93$) but were uncorrelated for the depressed mothers and their toddlers. Depressed mothers' total negativity was indiscriminately associated with toddlers' total positive, negative, or withdrawn behavior, as shown in Table 2. Thus, there was much greater predictability for the mother–toddler interactions involving maternal negativity or failure to maintain the interaction for the well group than the depressed group. Field (1984) also reported that, unlike infants of well mothers, infants of mothers with high levels of depressive symptoms showed little response to simulated maternal depressed behavior. If the depressed mother's negatively valenced behavior has very little to do with the nature of her child's behavior, both child and mother may conclude that they have little

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ability to influence one another, and withdraw, or they may come to rely mostly on highly negative influence tactics.

This puzzling matching of negative behavior among well but not mood-disordered mothers and their children merits replication and further exploration. A mother's depressed responding inhibits negativity both in her older children and her husband (Hops et al., 1987). Perhaps similar inhibition of young children's negativity occurred in the present play interaction when the depressed mothers engaged in negative behavior.

To further describe the behavior of the depressed and nondepressed mothers and their toddlers, the coders were asked to provide a written narrative of each dyad's particular style of interacting. Coders generally noted a higher level of social skill among the well than the depressed mothers. The coders reported that the affectively well mothers often introduced interactive games that provided an enjoyable, commonly understood scaffolding to their play. These games structured turn-taking, and supported Interactive Coordination. Elaborated forms of counting, naming colors, and peek-a-boo were enjoyed by both toddler and mother. The depressed mothers sometimes attempted to introduce such games, but more often than not the game was idiosyncratic and known only to the mother, but not to her child. It was more likely to disrupt than to structure their interaction. For example, one mother playfully attempted to stuff plastic rings onto her toddler's arm while the toddler was intently trying to stack the rings on the base of the stacking toy. These awkward attempts at engaging the children often failed and sometimes upset them. Further research might usefully include some assessment of participants' general level of social skill, such as their proficiency in common social routines, as well as their more specific interactive behaviors.

It is important to recognize that child characteristics such as attention span may play a role in interactional behavior. The children of the depressed mothers might have been more difficult to manage, since they switched activities more often (lower Maintain rates), perhaps indicating difficulty in sustaining their attention to tasks. Such children present a greater challenge to a caretaker who seeks to prolong an interactive focus with them as was required in the play task in this study.

The prediction that the children of depressed mothers would be less compliant than those of emotionally well mothers was not confirmed. In the depressed group, mothers' greater maintenance and repairs of interactions with their toddlers do correlate significantly with toddler compliance, as could be expected, but the group differences involving depression were slight. The field lacks commonly accepted behavioral definitions of toddlers' compliance, although there is much more agreement on such definitions for older samples. Our definition could have failed to capture essential features of compliance among young children. For example, Kochanska and Aksan (1995) found it meaningful to distinguish between wholehearted "committed compliance" and more reluctant "situational compliance." Our definition grouped all types of child compliance together. Yet, compliance as scored here related predictably to other interactional behaviors. The depressed mothers in our sample who showed more maintenance and repairs, and hence greater social skill, had more compliant children. These socially adept depressed mothers may foster the committed compliance in their children that Kochanska and Aksan (1995) noted in a group of highly internalized young children who shared mutually positive affect with their mothers. Our study did not rate positive affect separately, but high rates of maternal Maintain and Repair could be expected to foster a more positive interactional atmosphere, and hence more willing child compliance than maternal behaviors such as Direct and Negative.

The interactional data from this study suggest that depressed mothers who have low Repair rates could profit from instruction in the employment of simple turn-taking games to play with their children. Such activities would direct their attention to their child's behavior and induce them to accept their child's lead (accomplish a Repair) when required to do so by the game's rules. The children could also receive praise and other positive forms of attention for maintaining interactions rather

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than breaking them prematurely. Thus the results of this study yield clues to useful intervention procedures and also provide data on the utility of the Rocissano et al. (1987) interactional code in identifying specific dysfunctional features of interactions of psychiatrically diagnosable parents and their children.

The relatively small sample size and the ethnic homogeneity of the sample limit the analyses' power and the generalizability of the results. The brief observation period and unfamiliar laboratory setting pose additional limitations. A higher proportion of Negative, Direct, and other negatively valenced behaviors might be expected to appear during a longer observational period in the home or other natural settings as the participants adapt to the observers' presence. The correlational design did not enable us to establish causal relationships, although, by definition, some of the behavior coding categories identified particular sequences of interactions (e.g., Repair, which consisted of one partner's Uninvolved followed by the other's IC). A positive feature of the study is the use of a clinically depressed group who were sufficiently distressed to seek mental health treatment and are thus representative of an outpatient psychiatric population, which is uncommon in the maternal depression research literature. Many previous studies have identified multiple-problem or community samples of mothers with elevated depressive symptom scores as depressed, thus including a heterogeneous group with many subclinically depressed or nondepressed mothers. The comparison of the depressed group with a demographically highly similar group of nondepressed mothers and their children provided useful information on dyadic interactions of both groups.

In sum, clear differences in mother–child interactional modes associated with maternal depression were identified in brief observations of play behavior with affectively well mothers and their children displaying higher rates of Interactive Coordination and several other positive social behaviors than depressed dyads. The source of the interactional patterns associated with maternal mood disorder is as yet unclear and presents an inviting topic for future research. The distinctive features of the depressed mother–toddler interaction identified in this study suggest that early interventions might focus on promoting Interactive Coordination through training mothers to monitor their own and their child's interactive behavior and to make repairs in order to prolong constructive interactions.

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Appendix

Definitions of coding categories

The following categories were used in coding mother and toddler behaviors. Overall interrater agreement for mother behavior categories for one-third of the sample was $\kappa = .92$, and for child behavior categories, $\kappa = .78$. Each mother and child Turn was given one of the following codes:

Interactive Coordination (*IC*). One partner matched the social and object-related goal of the other. For example, a toddler responds to her mother's holding out a form box by trying to fit a block through one of the holes. Interrater agreement = 91%.

Uninvolved. (This category is the inverse of IC, so is not analyzed separately. Uninvolved is used solely to define Repair.) A partner was engaged in a solo activity which did not involve the other, or was a nonreactive onlooker. For example, the

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mother picks at a piece of plastic on a block while the child is trying to fit another block into the form box. Interrater agreement = 93%.

Negative. A partner responded to the action of the other with a controlling or humiliating negative response or by physically moving away or verbally protesting. For example, the toddler attempts to put a form block through a hole in the box and the mother issues a sharp "No! I told you THIS one!" Interrater agreement = 100%.

Direct. The probability that one partner attempted to change the other's object-related or social goal-directed activity, ignoring the other's current goals; that is, a social bid requested a change in activity without considering the attentional focus of the other. For example, while the toddler is trying to fit rings on a dowel, the mother tries to put rings on the toddler's arm. Interrater agreement = 85%.

Definitions of interactions

The following interactions are specific sequences containing the preceding behaviors. Scores in each composite category were computed for each dyad, controlling for base rates of occurrence. Interrater agreement was calculated on each behavior and overall, as described previously.

Maintain. The probability of Interactive Coordination (IC) given the other's preceding IC (i.e., the probability that the mother or toddler continues the other's previous IC). Example: The toddler picks up a form block, the mother extends the puzzle box to the toddler so the face matching the form faces the toddler, and the toddler (glancing at the mother) places the form into the hole. *Breaks are not coded separately because Maintain is the inverse of a break.* A Break occurs when a partner interrupts the interaction by changing a shared object or social goal in the absence of a social cue to do so. For example, mother and toddler are fitting the blocks into the holes in the box. The mother holds out a block for the toddler, but the toddler breaks the activity by turning away to play with a toy truck behind him.

Repair. A bid to resume Interactive Coordination that had been interrupted by the other. The probability of an IC for one partner, given the other's preceding Uninvolved (i.e., the probability that one partner changed activity to adopt the different goals of the other, thereby creating a mutual goal). No obvious social cues from the other invited such a change. For example, while the toddler is playing with crayons, the mother picks up a block. The toddler moves toward the mother and picks up a block which she holds out to her mother (Toddler Repair).

Comply. (Scored only for toddlers.) The probability of a toddler's IC given a preceding maternal Direct, that is, the probability that the toddler changed goals in response to a Direct from the mother.

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