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Families by Adoption and Birth: I. Mother-Infant Socio-emotional Interactions

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Abstract

The role of adoptive family dynamics in the etiology of both resilient and adverse developmental outcomes is not well understood. In this study, socio-emotional aspects of the mother-infant relationship were examined in families by adoption and by birth. Matched groups of mothers and their 5-month-old first babies were observed in the home setting. Dyads in the two groups were comparable in the frequency and ranking of a full array of age-appropriate behaviors. Group differences emerged for selected infant and maternal behaviors; infants by birth were in an alert state and smiled more often than infants by adoption, and adoptive mothers nourished and caressed their infants more than did mothers by birth. While the structure of the infant's behavior repertoire was similar for both groups, there were twice as many significant correlations among maternal behaviors for the birth group than for the adoptive group. There were also more correlations between maternal and infant behaviors for dyads by birth than for dyads by adoption, and the nature of the correlations differed for the two groups. It is argued that both groups of mothers and babies were functioning in the adaptive, healthy range, and that observed differences between them reflect subtle differences in behavioral emphasis, possibly related to the unique paths to parenthood represented by adoption and birth.

Keywords

Adoption; infancy; socio-emotional development

Since the middle of the twentieth century, a considerable literature has accrued suggesting that a greater proportion of adopted children than would be expected based on their numbers in the general population exhibits adjustment and behavioral problems beginning in middle childhood including aggression, hyperactivity, uncommunicative behavior, depression, and delinquency (Bimmel, Juffer, van IJzendoorn, & Bakersmans-Kranenburg, 2003; Brodzinsky, Radice, Huffman, & Merkler, 1987; Coon, Carey, Corley, & Fulker, 1992; Wierzbicki, 1993). At the same time, there is clear evidence that adoption confers benefits on children who would otherwise grow up in much less favorable conditions (Bohman & Sigvardsson, 1990; Hoksbergen, 1999; Palacios & Sanchez-Sandoval, 2003). As non-clinical samples of adoptive families have increasingly been studied, it has also become clear that being adopted does not necessarily mean that an individual child will have difficulties (Sharma, McGue, & Benson, 1998).

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Benefits of adoption are usually discussed in terms of the favorable demographic characteristics of adoptive families as compared to families of origin (Bohman & Sigvardsson, 1980; Fergusson, Lynskey, & Horwood, 1995). Heightened risk for adverse outcomes has been linked to heredity and pre-adoption experiential factors (Palacios & Sanchez, 1996; Plomin & DeFries, 1985), to the degree to which unique aspects of adoptive family life are acknowledged by family members (Kaye, 1990; Kirk, 1964), and to the necessity of coping with losses associated with adoption (Brodzinsky, 1990). Little attention has been paid to understanding similarities and differences in interpersonal behavioral dynamics in families by adoption and by birth.

Investigations of parenting and infant functioning in adoptive families have often used interview techniques and parental report data (Chisholm, Carter, Ames, & Morison, 1995; Greenbaum, Auerbach, & Guttman, 1989; Hoopes, 1982; Levy-Shiff, Bar, & Har-Even, 1990; Levy-Shiff, Goldschmidt, & Har-Even, 1991). This small literature suggests that, overall, adopted and birth infants grow and develop in similar ways during at least the first 2 years of life. In the Colorado Adoption Project, there were no differences between children by adoption and by birth at 1 or 2 years of age on measures of temperament or behavioral problems (Plomin & DeFries, 1985). Similarly, Singer, Brodzinsky, Ramsay, Steir, and Waters (1985) found no differences in temperament of adopted compared with birth children between 13 and 18 months of age. In the same investigation the quality of the infant-mother attachment relationship was comparable for birth infants and intra- racially adopted infants, although a greater proportion of inter- racially adopted infants were judged to have insecure attachments. Chisholm et al. (1995) found no differences in attachment security at 25 months between Romanian adopted infants who had arrived home within 4 months of birth and a control group of Canadian infants born to their parents.

With respect to parental behavior and family functioning in infancy, differences in adoptive and nonadoptive families tend to favor the former. In several investigations, higher levels of marital satisfaction have been reported for adoptive couples, both before becoming parents (Levy-Shiff et al., 1990) and afterwards (Hoopes, 1982; Humphrey, 1975). The transition to parenthood has also been reported to be more satisfying for adoptive couples (Levy-Shiff et al., 1990, 1991). Plomin and DeFries (1985) found little evidence for differences between adoptive and birth families or homes or at 12 or 24 months of age. In the Delaware Family Study, however, 6 months after the arrival of an infant, adoptive parents scored higher on fostering dependency and “deifying” their child whereas birth fathers scored higher on forcing of independence, suppression of affect, acceleration of development, and harsh punishment (Hoopes, 1982). In the same study at 2 years of age, adoptive mothers and fathers of toddlers were rated higher than parents by birth on parent-child relatedness, functioning within the family, handling the child, and accepting the child.

There is little in this small literature examining the infancy period to help clarify the etiology of socio-emotional problems evidenced by some adopted children in middle childhood and adolescence. At the same time, there has been almost no direct assessment of behavioral dynamics in adoptive families despite Brodzinsky’s call nearly 20 years ago to “...examine parent and child attribution patterns and interactive behaviors within adoptive and nonadoptive families over extended periods of time. Such an approach is likely to have a significant impact on our understanding of the increased vulnerability of adopted children to psychological and academic problems (Brodzinsky & Huffman, 1988, p. 281). In a recent review of theoretical perspectives underlying the choice of comparison groups in adoption research, Caballo and colleagues pointed out that most research “circumvents more complicated theoretical questions regarding within family relationships across different family types” and concluded that “variance within family types may emerge as the most robust predictor of family functioning

and family members' well-being" (Caballo, Lansford, Abbey, & Stewart, 2001, pp. 98–99). The present study responds to these concerns.

Part of a larger longitudinal investigation of the correlates of normative development in healthy children, matched groups of adoptive and nonadoptive mothers and infants were observed in the home environment during their typical daily routine, yielding data representative of the dyad's behavior and interaction as it had developed over the first few months of family life. Behaviors integral to early social exchanges within the dyad were compared in terms of mean levels of naturally occurring infant and maternal behavior, in terms of the correlational structure of infant and (separately) maternal behavior (coherence), and in terms of correlations between infant and maternal behavior (correspondence).

We expected to find no differences in the mean levels of socio-emotional behavior in the two groups of infants. We also expected that measures of infant behavior would cohere similarly for both groups. Because, like dyads by birth, most adoptive mothers and infants develop secure attachments that are predictive of later adjustment (Singer et al., 1985; Stams, Juffer, & van IJzendoorn, 2002), we predicted that both groups of mothers would engage in a range of developmentally appropriate social interactions with their babies. We modified this prediction, however, based on evidence that (1) infertile women experience significantly more depression, anxiety, psychological stress, and lowered self-esteem than do women in the general population (Link & Darling, 1986; Wright, Duchesne, Sabourin, Bissonnette, Benoit, & Girard, 1991); (2) adoptive mothers are challenged by the perception that they are not "real" mothers (Miall, 1987; Smith, Surrey, & Watkins, 1998); and (3) adoptive parents may be overprotective because they perceive their children as particularly precious (Hoopes, 1982). Based on these premises, we predicted that adoptive mothers would be inclined to interact more intensely (i.e., more frequently or for a longer duration) with their infants in an attempt to assure a close mother-infant bond, to demonstrate their maternal skills, and to experience the deep satisfaction of being a "real" parent. Because we anticipated that the behavior repertoires of both adoptive and birth mothers would fall within the normative range, we predicted that coherence and correspondence would not differ for the two groups.

In overview, this paper examines the social behavioral repertoires of mothers and their first infants at age 5 months in families by adoption and by birth. Families were selected to represent optimal circumstances for the establishment of a healthy, nurturing childrearing environment. Naturalistic data were collected in the home environment and were representative of the interaction patterns that had developed for mother-infant dyads over the early months of family life. Analyses compared mothers and infants in terms of mean levels of behavior, patterns of coherence of behaviors for each member of the dyad, and patterns of correspondence of behaviors between infants and mothers.

Method

Participants

Seventy-four mothers (37 women who had adopted and 37 women who had given birth) and their first children (21 males and 16 females in each group) comprised the sample. All parents were European American, married, and living together at the time of data collection. Adoptive mothers were recruited through local adoption agencies and adoptive family support groups in a major metropolitan East coast area. Mothers by birth were recruited using a mailing list of families in the same geographic area. Each mother by birth was selected to match an adoptive mother in terms of age, highest level of education attained, hours per week of maternal employment outside of the home when the infant was 5 months old, and socioeconomic status of the family as measured by the Hollingshead (1975) Four-Factor Index of Social Status

(Bornstein, Hahn, Suwalsky, & Haynes, 2003). The demographic characteristics for both groups of infants and mothers are presented in Table 1.

All infants were observed when they were approximately 165 days old ($SD = 7.4$). All birth infants went home from the hospital with their mothers; on average, adopted infants arrived home on the 21st day after birth ($SD = 36.29$, $range = 1 - 129$ days). There was, therefore, a difference between the two groups in the number of days infants had spent with their mothers prior to data collection. Among adopted infants, days living with mother ranged from 34 to 191 days at the time of the observation. There was also a difference between the two groups in birth weight, with birth infants weighing on average 445 g more than adopted infants. At birth, 89.2% ($N = 33$) of children were term, and all were healthy at the time of the study (none of four preterm children emerged as a univariate or multivariate outlier, so all were retained). There was no difference in mothers' reports, on a summary rating, of their infants' overall level of adjustment during the first month at home. However, on a check list, birth mothers reported more specific behavioral difficulties (such as frequent crying and excessive eating) during that time. There was no difference in mothers' ratings of the child's physical health status since birth, $\chi^2(1, N = 72) = .001$, ns . Adoptive and birth mothers did not differ in their timing of the infant's naps and meals; both groups reported that naps and meal times occurred on infant demand.

In the adoptive group, 31 infants were adopted domestically, either privately or through licensed agencies. Of 6 international adoptions, 4 infants were born in Asia, 1 in Latin America, and 1 in Eastern Europe. All adoptive parents were unrelated to the baby placed with them. The mean age at arrival for domestic placements was 8.3 days ($SD = 10.4$); for international placements, 89.5 days ($SD = 46.7$). Preliminary analyses revealed no differences between domestic and international placements on any behavioral indicators, and data were collapsed for all analyses. Thirty-eight percent of adoptive parents were present at the birth of their infant.

Exact matching of birth mothers with adoptive mothers on all variables was not possible. On average, adoptive mothers were nearly 2 years older, a marginal difference. The two groups did not differ in level of education or family SES. Adoptive mothers also averaged nearly 3 more years of employment prior to the arrival of their infant. At the time of data collection, however, there was no difference in extent of maternal employment; 22 adoptive mothers and 21 birth mothers worked outside of the home, $\chi^2(1, N = 43) = .81$, ns . Among mothers who were employed, there was no difference in number of hours worked. Both groups reported a relatively high and equal level of satisfaction with their employment/homemaker role balance. They also did not differ in the type or quality of childcare arrangements used while they worked.

As expected, adoptive mothers reported a greater number of pregnancy losses and more difficulty in becoming parents than did birth mothers. At the time of data collection, 87% of adoptive mothers reported that they had no concerns about the finalization of the adoption. Adoptive and birth mothers did not differ in their perceptions of the supportiveness of their husbands or extended family; however, adoptive mothers reported that they found community resources more helpful than did birth mothers. Prior to their baby's arrival, 68% of adoptive parents attended parenting classes versus 25% of birth parents, $\chi^2(1, N = 74) = 13.93$, $p < .001$.

Procedure

Mothers and infants were visited once at home by a single observer at 5 months, and an hour-long videorecord of naturally occurring mother-infant interaction was filmed. Prior to the visit, the mother was mailed a questionnaire designed to obtain information about herself, her infant, the baby's father, the adoption or birth, support networks for parenting, and the history of maternal employment and associated substitute childcare.

To assure that mothers' and children's behaviors were representative, and as a check against threats to validity, at the conclusion of the home visit the mother and the filmer independently evaluated mother-child interaction in the observation by marking a series of 8-point (*range* = 0 to 7) graphic rating scales, randomly ordered with respect to valence but recoded in ascending order. Adoptive and birth mothers rated themselves as having engaged in typical behavior, $M = 4.49$, $SD = 1.87$, and $M = 4.97$, $SD = 1.87$, $t(67) = 1.08$, *ns*, respectively. Adoptive and birth mothers also reported their children as having engaged in typical behavior, $M = 5.42$, $SD = 1.91$, and $M = 5.50$, $SD = 1.62$, $t(67) = 0.17$, *ns*. Both groups rated themselves as being comfortable being videorecorded, $M = 4.57$, $SD = 1.70$, and $M = 5.29$, $SD = 1.36$, $t(67) = 1.94$, *ns*. The filmer rated both groups of mothers as being relaxed during the observation, $M = 5.15$, $SD = 1.73$ and $M = 5.42$, $SD = 1.58$, $t(64) = 0.67$, *ns*.

Behavioral Variables

The first 50 min of each video were coded using mutually exclusive and exhaustive coding systems and real-time observation coding procedures (Bakemann & Gottman, 1997). The infant measures represent key developmental tasks and performance competencies that are critical to successful adaptation of an infant around the middle of the first year of life. Maternal measures encompass the primary parenting tasks and performance competencies required of the mother of a young infant. Interobserver reliability was measured using Cohen's (1960, 1968) Kappa (κ). Coders were trained to achieve, and then monitored to maintain, acceptable levels of agreement, as indexed by $\kappa \geq .60$ and percent agreement (%) $\geq 80\%$ (Hartmann & Pelzel, 2005).

Raters were blind to parenting status in most cases. All mothers and all but 5 adopted infants were European-American. The videorecords of both adoptive and control families were randomly distributed throughout a larger sample of 350 dyads. In the case of the 6 international adoptions, 4 (Asian) infants looked clearly different from their mothers, and 2 (European and Hispanic) were not obviously different. To further address the possibility of coder bias, these 6 cases were examined. None was found to be a statistical outlier.

Infant socio-emotional behaviors—Six infant behaviors were included. *Alert expression* is the mean standard aggregate of the number of times and total duration the infant's facial expression indicated interest, concentration, staring, or wide-eyed alertness ($\kappa = .66$, % = 87). *Look at mother* is the mean standard aggregate of the number of times and total duration the infant looked at the mother's face ($\kappa = .74$, % = 96). *Smile* is the mean standard aggregate of the number of times and total duration the infant smiled ($\kappa = .38$, % = 99). *Non-distress vocalization* is the mean standard aggregate of the number of times and total duration the infant expressed any positively or neutrally toned vocalization ($\kappa = .62$, % = 95). *Negative facial expression* is the mean standard aggregate of the number of times and total duration the infant displayed a distressed, angry, disgusted, or frowning countenance ($\kappa = .55$, % = 98). *Distress vocalization* is the mean standard aggregate of the number of times and total duration the infant produced vocalizations that indicated protest, anger, complaint, or upset ($\kappa = .66$, % = 98).

Maternal socio-emotional behaviors—Eight behaviors were included. *Speech to infant* ($\kappa = .71$, % = 89) is the mean standard aggregate of the number of times and total duration the mother spoke to the infant. *Imitation* is the mean standard aggregate of the number of times and total duration the mother imitated the infant's non-distress or distress vocalization ($\kappa = .39$, % = 99). *Direct attention to mother* is the mean standard aggregate of the number of times and total duration the mother drew the infant into face-to-face interaction with herself ($\kappa = .68$, % = 95). *Social play* ($\kappa = .71$, % = 98) is the mean standard aggregate of the number of times and total duration the mother directed high intensity verbal or physical behavior to the

infant to amuse the infant (i.e., to elicit smiles, laughter, or motoric excitement). *Hold* is the total length of time the mother held the infant ($\kappa = .95$, % = 98). *Pat/caress* ($\kappa = .68$, % = 99) is the mean standard aggregate of the number of times and total duration the mother expressed affection or positive evaluation to the infant by kissing, patting, or stroking the infant. *Nourish* is the total length of time the mother fed the infant ($\kappa = .92$, % = 98). *Caregive* is the sum of durations of five behaviors: bathing the infant, changing the infant=s diaper, dressing the infant, grooming the infant, and attending to the infant=s health needs ($\kappa = .89$, % = 98). Four infant behaviors, alert expression, look at mother, non-distress vocalization, and distress vocalization met and surpassed acceptable levels of interrater reliability; low kappas for smiling and for negative facial expression were attributable to the fact that these behaviors occur very infrequently (Ker, 1991). All maternal behaviors except imitate were reliable; the one low kappa was due, again, to the infrequent occurrence of maternal imitation.

Results

Preliminary Analyses: Infant Gender, Infant Awake, and Mother in View

At the univariate level, all variables were examined separately for nonnormalcy, heterogeneity of variance, presence of outliers, influential cases, and the need for transformation (Fox, 1997). Multivariate outliers were identified using a modification of the SPSS multivariate outlier screening procedure developed by Cook and Weisberg (1994). The assumption of equivalence of dispersion matrices was evaluated using *Box=s M*, and bivariate relations were examined graphically for nonnormality and/or influential cases. For infant behaviors, problems of nonnormalcy and influential outliers were resolved with log transformations for distress vocalization, negative expression, smiling, and non-distress vocalization and a square transformation for alert expression. For maternal behaviors, problems of nonnormalcy were resolved with log transformations for nourish, pat/caress, and social play, and cube root transformations for imitation and caregive.

Infant gender—Effects of gender were tested at the multivariate and univariate levels, all $ps > .05$. For both infant and mother behaviors, no significant gender main effects or Gender \times Group interactions were found; thus, analyses were conducted collapsing across gender, and results are reported for group effects only.

Infant awake—Infants in both groups were awake for virtually the entire observation session: On average, adopted infants were awake 99.2% of the session, and birth infants 99.7% of the session, $t(72) = .94$, *ns*.

Mother in view—The two groups were also similar in terms of the amount of time mothers were in view of their infants: 95.0% of the observation session on average for adoptive mothers, and 95.7% for birth mothers, $t(72) = .48$, *ns*.

Analytic Plan

Analysis of infant and mother behaviors followed three main paths. First, we explored similarities and differences in infant and mother behaviors between adoptive and birth families. *Group differences* were evaluated using both multivariate and discriminate function analyses with follow-up univariate tests of the dependent variables. In addition, all demographic and context variables were evaluated as possible covariates by examining the correlations with the dependent variables in the total sample, collapsing across parenting status. Follow up analyses of significant indicators controlled for covariates where applicable.

Second, separately for each group, we explored relations among infant behaviors and relations among maternal behaviors. *Coherence* refers to the covariation of behaviors within an

individual; so, for example, if mothers who feed their babies more also bathe them more, feeding and bathing would cohere into a positive manifold of routine care. Coherence is indexed statistically by the correlation coefficient of the two behaviors.

Finally, we explored relations between infant and maternal behaviors. *Correspondence* refers to the covariation between two individuals; so, for example, if mothers who encourage their babies more to look at them have babies who do look at them more, encouraging and paying attention would correspond in the dyad. Correspondence is indexed statistically by the correlation coefficient of the two behaviors. Between-group comparisons of correlations were made wherever appropriate.

Group Comparisons of Socio-emotional Behaviors

Infant behaviors—Table 2 shows, separately for adoptive and birth groups, rates of occurrence and proportion of an hour for the six socio-emotional behavior indicators. Non-distress vocalization had the highest rate of occurrence, followed by alert expression, looking at mother, smiling, distress vocalization, and negative expression. In terms of duration, alert expression dominated the infant=s hour for both groups, followed by non-distress vocalization, looking at mother, distress vocalization, smiling, and negative expression. Ranking of the 6 behaviors was comparable for the two groups of babies.

Table 2 also presents the means and standard deviations of the infant socio-emotional behaviors separately for each group. In a multivariate test of variance, Bartlett=s test of sphericity indicated sufficient correlation among the socio-emotional indicators to justify a multivariate approach, $\chi^2(1, N = 74) = 94.64, p < .001$. A test of the dependent variables, considered simultaneously, was significant, $F(6,67) = 2.44, p .03, \eta^2_p = .18$, with a moderate percentage of the variance in the discriminate function variate (18%) attributable to the group difference (Cohen, 1988). Evaluating the standardized discriminate function coefficients (*SDFC*) suggested that negative facial expression, smiling, and alert expression contributed more than did the other indicators (*SDFCs* $-.68, -.49$, and $-.49$, respectively). Smiling and alert expression were strongly correlated with the variate ($r = -.70$) and ($r = -.69$), respectively, and negative facial expression was moderately correlated with the variate ($r = -.39$).

Follow-up univariate analyses of variance of the dependent variables confirmed that birth infants smiled more than adopted infants, $F(1,72) = 7.80, p < .01, \eta^2_p = .10$, and that birth infants displayed alert expression more, $F(1,72) = 7.42, p < .01, \eta^2_p = .09$.

Mother behaviors—Table 3 shows, separately for adoptive and birth groups, rate of occurrence and proportion of an hour for the eight maternal socio-emotional behaviors. For both groups, speech to child had the highest rate of occurrence, followed by direct attention to mother, pat/caress, and social play. Hold, imitation, nourish, and caregive all occurred at relatively low rates. In terms of duration, hold, speech to child, and nourish occurred most often, and imitation was rare. Again, rankings of the 8 behaviors were the same for the two groups of mothers.

Table 3 also presents the means and standard deviations of the maternal socio-emotional behaviors, separately for each group. In a multivariate test of variance, Bartlett=s test of sphericity indicated sufficient correlation among the socio-emotional indicators to justify a multivariate approach, $\chi^2(1, N = 74) = 94.21, p < .001$. A test of the dependent variables considered simultaneously was significant, $F(8,65) = 2.11, p < .05, \eta^2_p = .21$, with a moderate percentage of the variance in the discriminant variate (21%) attributable to group differences. A comparison of the *SDFCs* suggested that a number of indicators contributed to the variate, and that nourish contributed the most (.65), followed by pat/caress (.57), imitation (–.56),

speech to child ($r = -.42$), and direct attention to mother ($r = .41$). The variate for the group was also highly correlated with nourish ($r = .56$), pat/caress ($r = .51$), and imitation ($r = -.41$).

Follow-up univariate analyses of variance of the dependent variables showed that adoptive mothers fed their babies more than birth mothers, $F(1,72) = 5.87, p = .02, \eta^2_p = .07$. Adoptive mothers also patted/caressed more than birth mothers, $F(1,72) = 4.90, p = .03, \eta^2_p = .06$.

Coherence Among Infant and Among Maternal Socio-emotional Behaviors

Coherence among infant behaviors—Table 4 shows correlations among infant socio-emotional behaviors, separately for the adoptive and birth groups. Correlations ranged from small to large. For the birth group only, there was a moderate negative correlation between smile and distress vocalization. For both groups, there were moderate to large positive correlations between alert expression and smile, and between negative facial expression and distress vocalization. None of the correlations differed between groups.

Coherence among mother behaviors—Table 5 shows the correlations among mother socio-emotional behaviors, separately for the adoptive and birth groups. Correlations ranged from small to large. For the adoptive group only, there were small to moderate positive correlations between imitation and pat/caress, hold and nourish, hold and caregive, and nourish and pat/caress. For the birth group only, there were moderate positive correlations between speech to child and imitation, direct attention to mother, social play, hold, and nourish; small to moderate positive correlations between direct attention to mother and imitation, hold, and pat/caress; and a moderate correlation between hold and pat/caress. There was also a moderate negative correlation between caregive and social play. In both groups, there was a moderate to large positive correlation between direct attention to mother and social play. None of the correlations differed between groups.

Correspondence Between Infant and Mother Behaviors

Table 6 shows correlations between infant and maternal socio-emotional behaviors. For the adoptive group only, there were moderate positive correlations between non-distress vocalization and imitation, direct attention to mother, and social play; there was a moderate positive correlation between negative facial expression and nourish. For the birth group only, there were moderate to large positive correlations between look at mother and speech to child, imitation, social play, nourish, and caregive. There were also moderate positive correlations between smile and social play and between distress vocalization and hold. None of the correlations differed between groups.

Discussion

Results of this study indicate that naturally occurring behavior repertoires of 5-month-old infants and mothers in adoptive and nonadoptive families are similar in many respects. Both groups of dyads engaged in a full and comparable range of appropriate socio-emotional behaviors. There were no indications that these mothers and babies were anything other than healthy, well-functioning dyads. At the same time, our data point to some ways in which the behavior repertoires of the two groups differed in structure within this common expectable range of functioning.

Because both groups of infants were healthy and had been with their families from a very early age, we predicted that they would be indistinguishable in terms of the frequency, ranking, and patterning of socio-emotional behavior. This prediction was largely confirmed. The rates of occurrence and ranking of behaviors were comparable for both groups, and the correlations among the six behaviors did not differ appreciably between them. As would be expected,

indicators of positive emotion were correlated, and indicators of negative emotion were linked in both groups. Mean group differences did emerge for 2 of 6 behavior comparisons. Birth infants were in an alert state significantly more often, although the proportions of time spent in that state were very similar for both groups. Infants by birth also smiled more often, although this finding must be viewed with caution. Taken as a whole, the data paint a picture of infant functioning that is largely similar for babies by birth and by adoption, which is in keeping with the literature reviewed earlier and reflects the resiliency of the human infant. A neonate enters the world with a behavioral repertoire that elicits caregiving and ensures that the baby will survive over a wide range of possible environmental and caregiving conditions (Bjorklund, Younger, & Pellegrini, 2002; Gould, 1977). Survival depends on the ability of the organism to adapt, within broad limits, to permutations in conditions and to grow and mature adequately despite them (Waddington, 1962). This is the reason that adoption of a young infant is a potentially very successful proposition and why adoption has been practiced in diverse cultures throughout history (Leon, 2002).

We predicted that both adoptive and birth mothers would engage in a range of appropriate socio-emotional interactions with their infants but that adoptive mothers might engage their babies more intensely in the socio-emotional sphere. This prediction was partially upheld. The levels and rankings of maternal socio-emotional behaviors were comparable for the two groups of mothers; they engaged their 5-month-old babies in ways that were similar, varied, and age-appropriate. At the same time, mean group differences emerged on 2 of 8 measures. Adoptive mothers provided more nourishment and patted/caressed their babies significantly more than mothers by birth. Adoptive mothers may affectionately touch their babies more frequently because their babies are perceived as especially precious (Hoopes, 1982). That adoptive mothers fed their infants more, however, is surprising. Both groups of babies were healthy and developing normally, instructions to all mothers were identical, emphasizing that they should go about their “usual routine,” and the two groups were not filmed at different times of the day. Feeding an infant is fundamental to the baby’s survival and is one of the first critical responsibilities of a parent (Bornstein, 2006). All new mothers must learn, through trial and error, how to do it effectively (Spock & Needlman, 2004). Parenting success is closely monitored and is indexed by the infant’s weight gain. Thus, feeding her infant becomes a first critical test of an adoptive mother’s competence in the parenting role. Nourishing was positively correlated with both pat/caress and hold for adoptive, but not for birth, mothers. It is possible that quietly holding, stroking, and feeding a baby is a particularly gratifying activity for adoptive mothers. They may, even unwittingly, extend feeding sessions or initiate them more frequently in their efforts to effectively parent their child.

Contrary to our expectation, some differences in the patterns of coherence among maternal socio-emotional behaviors were also noted. Although the correlations did not differ statistically between adopted and birth groups and must await replication with a larger sample, highlighting them may serve a heuristic purpose, given that this is the first time that the structure of behavior in adoptive vs. birth mothers of infants has been reported. There were more than twice as many significant correlations among socio-emotional behaviors for birth mothers, and the nature of the linkages differed for the two groups. Speech to child, imitation, direct attention to mother, and social play were all intercorrelated for birth mothers, whereas there was only one correlation among these variables (between direct attention to mother and social play) in mothers by adoption. Maternal speech to child was positively correlated with 5 of 7 maternal behaviors for birth mothers, but with no other behaviors for mothers by adoption. Measures of physical contact were linked to measures of maternal care (nourish and caregive) for adoptive mothers, but not for mothers by birth.

These data suggest that, by the middle of an infant’s first year, the socio-emotional repertoire is more coherent for birth than for adoptive mothers. This might be because birth dyads had

spent more time together than adoptive dyads by the time of data collection. However, the majority of the adopted babies arrived home within the first two weeks of life, over one-third of adoptive parents in the sample had actually been present at the birth of their child, and none of the adopted infants who arrived home at an older age was identified as a statistical outlier. Another possibility to explain the difference in coherence is that mothers by adoption felt especially self-conscious during the data collection with the result that their behavior was less relaxed and natural, resulting in altered patterns of coherence. The fact that the frequencies and durations of maternal behavior were very similar for both groups (Table 3) makes this explanation less plausible. Furthermore, on a set of rating scales completed immediately after the filming, both groups of mothers reported that they felt comfortable being observed.

Differences in the coherence of maternal behavior between adoptive and birth mothers might also occur because adoptive and birth mothers embark on motherhood with different attitudes which, in turn, influence their parenting behavior. Becoming a parent is very different in families that adopt compared to those that give birth. Ordinarily, couples seek to adopt only after a protracted period of time during which they have been confronted with multiple challenges in their attempt to start a family. A sizeable percentage experience infertility (Chandra, Abma, Maza, & Bachrach, 1999; Daly, 1988, 1992; Sandelowski, Holditch-Davis, & Harris, 1990). All confront the frustrations and uncertainties of the adoption process (Brodzinsky, 1997; Daly, 1988), and all are exposed to stigma that traditionally attach to alternative forms of family-building in our culture (Kirk, 1985; March & Miall, 2000; The Evan B. Donaldson Adoption Institute, 1997). In a society that expects that a parent is one who gives birth to a child, these obstacles and challenges are stressful and have well-documented negative effects on couples (with women being particularly vulnerable) including anxiety, depression, loss of self-esteem, and decreased psychosocial, sexual, and marital adjustment (Daly, 1988, 1992; Link & Darling, 1986, 1992; Wright, et al., 1991). Not surprisingly, this set of conditions can also function to undermine adoptive parents' sense of entitlement, self-confidence, and parental identity (Miall, 1987; Wegar, 1995, 2000). It is plausible to speculate that, because of the different family-building experiences they have had, parents who adopt and those who give birth will bring subtly altered perceptions of and expectations for themselves and their children to the task of creating a family (Levy-Shiff et al., 1991), which, in turn, may lead to differences in the ways in which family members interact and the ways that relationships develop. In the present sample, the road to parenthood was perceived to be more difficult by the adoptive families. In response to the question, "As you experienced it, how would you describe the process of becoming a parent (achieving parenthood)" (for which answers could range from 1-*Very Easy; Not Frustrating* to 5-*Very Difficult and Frustrating*), adoptive mothers ($M = 3.76$) scored significantly higher than mothers by birth ($M = 2.34$).

The data for correspondence did not entirely support our expectation that birth and adoptive dyads would be comparable. There were a greater number of significant associations for birth than for adoptive dyads, spanning a greater range of maternal behavior modalities and involving different behaviors. Infant look at mother was linked to 5 of 8 maternal behaviors for birth pairs, but to none for adopted dyads. Infant non-distress vocalization was linked to several maternal behaviors for adopted dyads but to none for the birth group. These data suggest the possibility that the two groups of mothers and infants are "tuning in" to each other on different channels. Correlational data do not allow speculation about how these patterns were established. It is interesting to note, however, that the differential patterns of correspondence appear to be independent of the rates of occurrence of infant and maternal behaviors. Both groups of infants, for example, looked at their mothers and vocalized non-distress at comparable (and relatively high) rates; maternal behaviors involved in the differential patterns of linkages were also largely comparable for both adoptive and birth mothers. Within behavior repertoires that appear very similar, the internal structure of socio-emotional exchanges between mother and baby differs in some ways for adoptive and birth dyads. It seems probable,

as postulated by the systems view (Bornstein & Sawyer, 2006), that patterns that exist by the middle of the first year will influence the nature of subsequent mother-infant interaction, serving to perpetuate group differences. For example, en-face visual contact constitutes a powerful connection between any two people, and mothers strive to engage their babies in this way. When a pattern of infant looking in conjunction with selective maternal behaviors coheres, as it does for the birth group, it should act as an especially effective reinforcer, strengthening and extending the dyadic connections by increasing the mother's sense of efficacy and pleasure in parenting her baby.

Overall, this study provides some enticing support for the notion that mother-infant interaction in the socio-emotional sphere differs in adoptive and birth families (Levy-Shiff et al., 1990, 1991). For the first time, behavioral indicators that discriminate between adoptive and birth mothers and their healthy infants have been identified. Our data hint at differences in interactive emphasis and selective responding in the two groups. At the same time, the fact that all mothers and babies in the study appeared to be behaving in an age-appropriate manner with similar and varied behavioral repertoires jibes with the consensus in the literature that most adopted children thrive, especially if adopted at an early age (Juffer & Rosenboom, 1997; Morison & Ellwood, 2000). It is important to stress that the differences that we found do not represent dysfunctional patterns for one group or the other. Rather, they reflect variations in behavioral organization within a common expectable range. Although these results cannot be extrapolated to interaction patterns or outcomes at older ages and must await replication with larger samples, they suggest a potentially fruitful avenue of continued investigation. It is possible that subtle early differences in behavioral patterns could produce, over time, more salient mean differences between families by adoption and by birth on some aspects of functioning (Abelson, 1985; Bornstein & Sawyer, 2006). We have purposefully pointed out candidates for more in-depth investigation. Increasing our understanding of the nature of parent-child interaction in community samples of adoptive families may contribute to identifying factors that uniquely influence the development of adopted children as well as contribute to a deeper appreciation of the range of contexts within which children can thrive.

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Demographic Characteristics of Adoptive and Birth Samples

	Adoptive (N=37)		Birth (N=37)		<i>t</i>	<i>df</i>	<i>p</i> ≤	η^2_p
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>				
Infant								
Age (days)	165.49	8.99	163.51	5.41	1.14	59.03 ^a	<i>ns</i>	.02
Days with mother since Birth	144.27	36.53	163.51	5.41	3.17	37.58 ^a	.002	.12
Birth weight (g)	3213.57	595.53	3658.24	497.05	3.49	72	.001	.14
Newborn adjustment Scale (1–5)	1.59	.96	1.95	1.10	1.46	72	<i>ns</i>	.03
Neonatal number of Difficulties (0–10)	.72	.78	1.66	1.00	4.41	69	.001	.22
Schedule	5.53	.91	5.19	1.37	1.24	71	<i>ns</i>	.02
Mother								
Sociodemographic variables								
Age (at birth)	36.30	4.55	34.50	3.52	1.91	72	.06	.05
Education(Hollingshead)	6.49	.73	6.49	.69	.00	72	<i>ns</i>	.001
SES (Hollingshead)	58.49	6.58	59.28	6.08	.54	72	<i>ns</i>	.004
Years employed prior To infant arrival	14.11	5.26	11.89	4.28	1.99	72	.05	.05
Hours of employment per week**	29.27	12.23	35.14	8.47	1.82 ^a	41	<i>ns</i>	.07
Context variables								
Satisfaction with role Balance (1–5)	4.00	.94	4.09	1.00	.38	69	<i>ns</i>	.002
Childcare: Quality	4.14	2.99	4.37	3.05	.32	68	<i>ns</i>	.001
Childcare: Type	1.83	1.13	1.74	.87	.36	68	<i>ns</i>	.002
Pregnancy losses	1.08	1.40	.31	.76	2.86	69	.01	.11
Difficulty becoming a Parent (1–5)	3.76	1.57	2.34	1.24	4.23	70	.001	.20
Social Support: Spouse	3.30	.53	3.15	.93	.84	72	<i>ns</i>	.01
Social Support: Extended family	1.53	.95	1.76	1.00	1.00	72	<i>ns</i>	.01
Social Support: Community	2.13	.73	1.72	.77	2.36	72	.02	.07

^a Adjusted for unequal variance.

* For ease of interpretation, data shown based on standardized scores.

*** Includes only mothers who work.

Descriptive Statistics for Infant Socio-emotional Behaviors and Adoptive-Birth Group Differences

Table 2

Behaviors	Adoptive		Birth		F	df	p≤	η ² _p
	M	SD	M	SD				
Alert expression: Mean z score	3.88	1.04	4.50	1.16	7.42	72	.01	.09
Frequency: Rate per hour	102.02	43.16	135.37	34.54				
Duration: Proportion of hour	.75	.11	.73	.09				
Look at mother: Mean z score	4.43	1.90	4.33	1.91	.05	72	ns	.00
Frequency: Rate per hour	71.17	30.38	66.19	30.15				
Duration: Proportion of hour	.08	.05	.08	.05				
Smile: Mean z score	2.12	2.17	2.90	1.71	7.80	72	.01	.10
Frequency: Rate per hour	10.64	19.69	17.32	14.46				
Duration: Proportion of hour	.006	.01	.01	.01				
Non-distress vocalization: Mean z score	3.89	1.92	4.19	1.73	.95	72	ns	.01
Frequency: Rate per hour	140.41	74.74	150.13	73.54				
Duration: Proportion of hour	.08	.06	.09	.06				
Negative facial expression: Mean z score	2.48	2.20	2.82	1.55	2.43	72	ns	.03
Frequency: Rate per hour	6.45	8.38	9.05	6.93				
Duration: Proportion of hour	.01	.02	.01	.01				
Distress vocalization: Mean z score	2.53	2.03	2.51	1.87	.00	72	ns	.00
Frequency: Rate per hour	10.74	12.61	10.02	12.64				
Duration: Proportion of hour	.01	.02	.02	.02				

Descriptive Statistics for Mother Socio-emotional Behaviors and Adoptive-Birth Group Differences

Table 3

Behaviors	Adoptive		Birth		F	df	p≤	η ² _p
	M	SD	M	SD				
Speech: Mean z score	4.45	1.69	4.83	1.90	.80	72	ns	.01
Frequency: Rate per hour	327.03	118.09	357.92	124.95				
Duration: Proportion of hour	.27	.12	.28	.14				
Imitation: Mean z score	2.06	1.58	2.84	2.23	2.95	72	ns	.04
Frequency: Rate per hour	4.15	6.08	8.04	9.88				
Duration: Proportion of hour	.002	.003	.003	.004				
Direct attention to mother: Mean z score	3.79	1.75	3.55	1.78	.35	72	ns	.005
Frequency: Rate per hour	28.23	16.88	26.72	19.91				
Duration: Proportion of hour	.10	.08	.09	.07				
Social play: Mean z score	3.02	1.80	3.24	1.93	.26	72	ns	.004
Frequency: Rate per hour	16.30	13.92	18.06	15.44				
Duration: Proportion of hour	.04	.04	.04	.04				
Hold: Mean z score	4.28	1.55	4.12	1.49	.18	72	ns	.002
Frequency: Rate per hour	6.39	4.11	7.91	4.43				
Duration: Proportion of hour	.45	.23	.35	.18				
Pat/caress: Mean z score	3.54	2.00	2.66	1.20	5.25	72	.03	.06
Frequency: Rate per hour	30.24	23.45	22.12	14.12				
Duration: Proportion of hour	.05	.06	.02	.03				
Nourish: Mean z score	3.68	1.89	2.72	1.45	6.03	72	.02	.07
Frequency: Rate per hour	9.51	7.57	5.29	4.01				
Duration: Proportion of hour	.20	.18	.15	.16				
Caregive: Mean z score	2.84	.85	3.14	.86	.47	72	ns	.01
Frequency: Rate per hour	3.34	3.55	3.76	3.15				
Duration: Proportion of hour	.09	.11	.11	.11				

Coherence Among Infant Socio-emotional Behaviors

Table 4

Behaviors	1	2	3	4	5	6
1 Alert expression						
2 Look at mother	.16*					
3 Smile	.40*	.11	.52***	.07	-.09	-.18
4 Non-distress vocalization	-.03	.30	.28	-.01	-.07	-.02
5 Negative facial expression	-.07	.32	.22	.20	-.18	-.39*
6 Distress vocalization	-.12	-.19	-.03	.06	.09	.16***
		-.21	-.16	.09	.87***	.60***

Note. The correlation coefficients of Birth group ($N = 37$) are presented above the diagonal, and the correlation coefficients of the Adoptive group ($N = 37$) are presented below the diagonal.

* $p \leq .05$;

** $p \leq .01$;

*** $p \leq .001$

Table 5

Coherence Among Mother Socio-emotional Behaviors

Behaviors	1	2	3	4	5	6	7	8
1 Speech to child								
2 Imitation	-.01	.40*	.31*	.36*	.30*	.15	.48***	.21
3 Direct attention to mother	.21	.08	.33*	.27	.11	.17	.10	.16
4 Social play	.14	.04	.45**	.59***	.42**	.28*	.03	-.12
5 Hold	.10	-.17	.14	.20	.23	.12	.05	-.30*
6 Pat/caress	.25	.35*	.12	.10	.13	.43**	.19	.13
7 Nourish	.15	-.08	-.14	-.13	.40**	.28*	.22	.07
8 Caregive	.25	-.11	-.27	-.10	.41**	-.09	-.01	.17

Note. The correlation coefficients of Birth ($N=37$) are presented above the diagonal, and the correlation coefficients of Adoptive ($N=37$) are presented below the diagonal.

* $p \leq .05$;

** $p \leq .01$;

*** $p \leq .001$

Correspondence Between Infant and Mother Socio-emotional Behaviors in Adoptive and Birth Samples

Table 6

Infant Behaviors	Mother Behaviors							
	Speech to child	Imitation	Direct attention to mother	Social play	Hold	Pat/caress	Nourish	Caregive
Alert expression	.16	.07	.19	-.07	-.09	-.14	-.04	.01
Look at mother	.13	.14	.25	.27	-.01	.13	-.11	.05
Smiling	.32	.23	.16	.12	-.06	-.13	.11	.02
	.44**	.56***	.27	.36*	-.01	.14	.37*	.33*
Non-distress vocalization	.20	.15	.30	.03	-.23	-.10	-.17	-.15
	-.02	.02	.22	.41*	.03	.31	-.08	-.17
Negative facial expression	-.12	.39*	.36*	.35*	-.08	.23	-.04	-.29
	-.23	.08	.23	.14	.17	.01	-.15	-.14
Distress vocalization	-.20	.07	-.18	-.24	.23	.09	.32*	.06
	.11	.22	.03	.01	.21	.25	.21	-.16
	-.26	.16	-.24	-.12	.17	.10	.21	.10
	.11	.26	.04	-.08	.34	.10	.09	.08

* $p \leq .05$;
 ** $p \leq .01$;
 *** $p \leq .001$