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Infants at Social Risk: Maternal Depression and Family Support Services as Mediators of Infant Development and Security of Attachment

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Abstract

LYONS-RUTH, KARLEN; CONNELL, DAVID B.; CRUNEBaum, HENRY U.; and BOTEIN, SHEILA. *Infants at Social Risk: Maternal Depression and Family Support Services as Mediators of Infant Development and Security of Attachment.* CHILD DEVELOPMENT, 1990, 61, 85–98. 31 infants at high social risk due to the combined effects of poverty, maternal depression, and caretaking inadequacy were assigned to weekly home-visiting services. At 18 months infant age, the home-visited infants were compared with 2 groups of socioeconomically similar unserved infants on measures of infant development, infant attachment, mother-infant interaction, maternal depression, and maternal social contacts. Home-visited infants of depressed mothers outperformed unserved infants of depressed mothers by an average of 10 points on the Bayley Mental Scale and were twice as likely to be classified as securely attached, with unserved high-risk infants showing a high rate of insecure-disorganized attachments. Duration of services was positively correlated with maternal involvement at 12 months. Results of the study point both to the negative developmental consequences associated with severe social risk conditions and to the buffering effects of developmentally oriented home-visiting services for infants at greatest social risk.

Low socioeconomic status predicts lower mental development scores beginning in the second year of life, impoverished language development, placement in special classes, and school failure (Bryant & Ramey, 1987; Sameroff & Chandler, 1975). Low SES is also a significant predictor of childhood psychopathology during the school years (Rutter et al., 1975). More recent investigations have begun to question whether these differences between SES groups describe most members of each group or whether specific subgroups in broader low-SES population are contributing disproportionately to the group differences.

Risk factors associated with low SES include infant prematurity, adolescent parenthood, single parenthood, and parental psychiatric disorder. Other investigators have shown that such risk factors are often correlated, and that poor child outcomes increase multiplicatively

rather than additively with successive additional risks, so that children in multirisk families represent the most seriously developmentally impaired group (Rutter, 1979; Sameroff, Seifer, Barocas, Zack, & Greenspan, 1987).

Since the mid-1960s, developmental researchers have been investigating how to design social programs to help such economically stressed families support the social and cognitive development of their children. Studies in the late 1960s and 1970s investigated both the effects of classroom-based preschool programs on later school achievement of disadvantaged children and the success of home-based programs in improving cognitive development of infants and toddlers aged 0–3. These studies have been reviewed by Bronfenbrenner (1974) and more recently by Bryant and Ramey (1987). Bronfenbrenner's major conclusion, supported again by Bryant and Ramey, was that there were reliable effects of developmentally oriented programs on children's language and cognitive skills. However, he also concluded that the most socially disadvantaged families, which he identified with low educational level, single parenthood, and AFDC status, may be unable to maintain their participation in these programs due to overwhelming economic and social problems. Other early intervention programs have repeatedly mentioned the need for increased social work staff to address the many family needs and problems that impede the family's ability to participate in the program and to focus on the developmental needs of the child. Yet these families experiencing multiple stresses are the ones whose infants are at greatest risk for developmental problems and in the greatest need of developmentally oriented programs.

While earlier intervention studies emphasized cognitive curricula and cognitive outcome measures, long-term follow-up studies have indicated that the social and motivational effects of early intervention may be the most important long-term sequelae of program participation (Lazar & Darlington, 1982; Schweinhart & Weikart, 1980). Assessments of the adequacy of social-emotional development during the infant and preschool period have rarely been included as outcome measures, however, despite prominent advocates of the need for assessment of social competencies (Zigler & Trickett, 1978).

The intervention study to be reported on was designed to assess whether the most stressed families with infants could benefit from home-based intervention services when offered by experienced staff with determined outreach and intensive attention to family health and social service needs. Both social and cognitive development were identified as areas for intervention, with outcome assessments included for both domains.

Two questions were addressed by the study. The first question was whether benefits to infants would differ by level of treatment (weekly lay home visitor vs. weekly professional home visitor plus weekly group meeting). The second question was how developmental outcomes for infants receiving intervention services would compare both to outcomes of high-risk infants who did not receive services and to socioeconomically similar infants in the community. Since infants and mothers in both of the two service levels received weekly hour-long home visits, and since no differences were observed by service level (Lyons-Ruth, Zoll, Connell, & Odom, 1987), this report addresses the second question, with infants from both levels of treatment analyzed as a single group.

The focus on the most distressed low-income families of infants required that home visitors have strong working relationships with a variety of community agencies, leading to a smaller program within a single state-defined mental health service area for urban low-income families. Targeting the most at-risk infants further required a sample based on actualized risk rather than on demographic risk alone. Demographic selection criteria alone are likely to result in the inclusion of many families with adequate parenting skills (Madden, O'Hara, & Levenstein, 1984). Therefore, families were accepted into the intervention group based on observed caretaking difficulties and were not recruited prenatally. One additional goal of the study was to develop summary criteria for describing the group of families whose caretaking problems were of most concern to community observers.

Method

Subjects

Mothers and infants were referred to the intervention group by calls from staff members of health, educational, and social service agencies serving low-income families because of staff concerns about the quality of the caregiving environment for the infant. Extensive publicity for the program was disseminated for 6 months prior to the beginning of services, so the program was well known to the community. Program publicity stressed that the program was offered for the most distressed families with infants, and no family was rejected by the program because of the degree of caretaking disturbance. Staff members from the following agencies referred families to the program: Head Start; Women, Infants, and Children Food Voucher Program; State Department of Protective Services; neighborhood pediatric clinics of the city hospital; state hospital inpatient psychiatric services; city hospital inpatient and outpatient psychiatric services; private Family and Children's Service Agency; Visiting Nurses Association; Home-based Early Stimulation Program for Toddlers; private hospital obstetric ward; public child guidance clinic; private hospital failure-to-thrive service; private hospital pediatric ward. In addition, two families were self-referred after seeing program publicity. Infants were required to be aged birth to 9 months at study entry. Referral calls were followed up by staff screening to verify risk status and by extensive recruitment efforts with the families.

Of 40 high-risk families offered participation, four families refused and one moved away during the intake interviews. Of the 35 families who agreed to participate, two maltreatment cases dropped out during the first 2 months and were replaced by other maltreatment cases. A third mother with a history of psychosis and infant neglect could not continue with the program after 3 months when her infant was permanently removed from her custody. One additional family moved out of the county when the infant was 14 months old and did not participate in the 18-month assessment. During nonpermanent separations of mother and infant due to family crisis, temporary foster placement, or illness, program participation was continued and contact between mother and child was facilitated by program staff.

Seventy-four percent of the 31 high-risk families with complete data fell into one of the following three categories: maternal history of state-documented child maltreatment, maternal history of psychiatric hospitalization, or current maternal depression as documented by the CES depression scale described below. Seventy percent of maltreating

mothers and 61.5% of previously hospitalized mothers were also depressed. Eighty-one percent of treated families were supported by government assistance payments. Further demographic characteristics are shown in Table 1. The mean infant age at intake was 4.7 months. By 18 months of age, the 31 infants received 9–18 months of service, depending on age at intake, with an average of 13.3 months. In 13 months of service, an average of 46.7 completed home visits were carried out per family.

The four central goals of the home-visiting service were similar for the two service levels (paraprofessional/professional) as follows: (1) providing an accepting and trustworthy relationship; (2) increasing the family's competence in accessing resources to meet basic needs, including social, financial, legal, health, and educational services; (3) modeling and reinforcing more interactive, positive, and developmentally appropriate exchanges between mother and infant, with emphasis on the mother's dual role as teacher and source of emotional security for her infant; (4) decreasing social isolation from other mothers through encouraging weekly participation in parenting groups (professional service) or monthly participation in a drop-in social hour (paraprofessional service). Home visitors' caseloads included three families each 8 hours of salaried time.

The two service levels differed in philosophy and staff characteristics as well as frequency of contact. In the paraprofessional service, lay visitors were mothers from the low-income community being served, and home visits included Levenstein's toy demonstration procedure (Madden et al., 1984) as well as attention to basic family social service needs. The professional service was staffed by master's level psychologists, included weekly home visits and weekly group meetings, and relied more on the psychodynamic model pioneered by Fraiberg (1980). Both service models and client characteristics are described in more clinical detail in Lyons-Ruth et al. (1984).

Two nonintervention groups were also assessed. The second group, a group of 10 families labeled the high-risk untreated group, was identified at 18 months of age through the same clinical referral process used to identify the high-risk infants, but this group was referred at 18 months and was assessed prior to the provision of short-term intervention services. Families who had refused or dropped out of infant services were not eligible for this group. Eighty-one percent of the mothers were either depressed or had a history of psychiatric hospitalization. There were no state-documented maltreatment cases. However, the home-visiting staff filed maltreatment petitions on two families which the state protective service agency subsequently screened out as not severe enough to meet their criteria for maltreatment.

The third group, a group of 35 families labeled the community group, was a matched comparison group of mothers and infants from the same neighborhoods who had never sought or received social services directed at parenting skills, had never been identified as maltreating, and had never undergone extensive psychiatric treatment. The community group mothers were individually matched to high-risk mothers on per-person family income; mother's education, age, and race; and the child's age, sex, and birth order (firstborn, later-born). Table 1 also presents demographic and social risk data for the two unserved groups.

Although, as a group, the community sample was lower in risk, 22.9% of community mothers reported depression on interview. The mean depression score for this depressed community subgroup was similar to the mean scores for the depressed high-risk subgroups, with scores of 26.9 for the community subgroup, 30.0 for the high-risk treated subgroup, and 31.8 for the high-risk untreated subgroup.

Assessment Procedures

The following assessments were collected in three contacts with the family within a 2-week period when the child reached 18 months of age. Mothers and infants in the high-risk treated group and in the community group were also assessed at 12 months on the home observation, Bayley Scales, and Strange Situation procedure.

Demographic data.—Ten demographic variables, including the six used for matching purposes, were coded from maternal interviews: mother's race, whether mother was a high school graduate, per person weekly income (including government assistance and food stamps), mother's age at birth of the target child, child's sex and birth order, mother's age at the birth of her first child, whether mother was a single parent, whether the family was supported by government assistance, and the number of siblings under age 6.

A cumulative demographic risk score was computed from these variables by summing the presence of the following nine factors: mother nonwhite, no high school diploma, AFDC recipient, no male partner, mother under 20 at birth of first child, more than two children under age 6, male infant, and maternal IQ estimate at or below fortieth percentile (see Methods below). Since maternal IQ data were available only for 63 subjects, treatment by depression subgroup means were substituted for missing data. Three additional variants of the cumulative risk score were also computed: one omitting IQ, one omitting male sex, and one using only the 63 subjects with IQ data. All four variants were tried in all cumulative risk analyses in this report. Since all four variables yielded similar results, only the results obtained with the most comprehensive variable are reported.

Maternal depression.—Maternal depression was assessed by the Center for Epidemiologic Studies Depression Scale (CES-D), a 20-item, 60-point questionnaire administered orally, asking about depressive symptoms during the past week (Radloff, 1977). It has been well validated in large-scale epidemiologic studies, with 80%–91% of the population scoring below the cut-off point of 16, and 99% of patients with known depression scoring above 16 (Husaini, Neff, Harrington, Hughes, & Stone, 1980; Weissman, Sholomskas, Pottenger, Prusoff, & Locke, 1977). The depression scale was administered at intake and at 18 months to high-risk treated mothers and at 12 and 18 months to community mothers. There was little change over time in either group, with 84%–85% maintaining the same depression status, $r = .67$, $r = .74$, and no consistent direction of change among the remainder. For comparability, 18-month scores are used for all subjects in this report.

Maternal social isolation.—The mother's social contacts in the 5 days preceding assessment were assessed through a detailed reconstruction of her social activities, modeled after a daily activities assessment developed by Brown and Rutter (1966). The 5-day period

was adjusted if necessary to include 2 weekend days. Phone conversations and visits inside or outside the home with friends or relatives were tallied. Visits with social service or health personnel were excluded.

Maternal verbal IQ.—To provide an estimate of maternal verbal IQ, the Similarities subscale of the Wechsler Adult Intelligence Scale was administered orally. In the WAIS standardization sample, this subscale had a reliability coefficient of .85 and correlations of .79 and .83 with Full-Scale IQ and Verbal IQ, respectively (Wechsler, 1955). The scale was added to the assessment protocol after 13 subjects had been interviewed, yielding an *N* of 63.

Maternal behavior at home.—Naturalistic mother-infant interaction was videotaped at home for 40 min when the infants were awake and alert. Mothers were told that the observer was interested in recording a typical segment of the infant's day and asked to conduct themselves as they usually would. Maternal behavior was coded in 10 4-min intervals on 12 five-point rating scales and one timed variable. These included Sensitivity, Warmth, Verbal Communication, Quality and Quantity of Comforting Touch (physical contact in the service of communicating affection, "touching base," or reducing distress), Quality and Quantity of Caretaking Touch, Interfering Manipulation, Covert Hostility, Anger, Disengagement, Flatness of Affect, and Time Out of Room, rounded to the nearest half minute.

The sensitivity scale was from Ainsworth, Bell, and Stayton (1971), collapsed from a 9-to a 5-point scale. Detailed behavior items, from which the Covert Hostility and Interfering Manipulation scales were constructed, were based on the work of Crittenden (1981). The Flatness-of-Affect scale assessed the degree to which facial and vocal tone were unchanging and expressionless. Coders were blind to all other data on the families. Interobserver reliabilities, computed on 20% of the home videotapes, yielded percentages of agreement, calculated within 1 point, above 90% for all scales, with a mean of 97.2%. Cohen's kappa coefficients ranged from .45 to .81, all $p < .001$.

Principal components analyses of the scales yielded two similar main factors at 12 months ($N = 53$) and at 18 months ($N = 77$). Factor 1, labeled Maternal Involvement, accounted for 38%–43% of the variance and included negative loadings ($> .50$) for maternal Disengagement and positive loadings for maternal Sensitivity, Warmth, Verbal Communication, Quantity of Comforting Touch, and, at 12 months only, Quality of Comforting Touch and Quantity of Caretaking Touch. Factor 2, labeled Hostile-intrusiveness, accounted for 20%–26% of the variance and included negative loadings for Quality of Comforting Touch and Quality of Caretaking Touch and positive loadings for Covert Hostility, Interfering Manipulation, and, at 18 months only, Anger.

Infant development.—The Bayley Scales of Infant Development, Mental and Motor Scales, were administered to each infant in a laboratory visit before assessment in the Ainsworth Strange Situation.

Infant attachment security.—Within 2 weeks of the home videotaping, mothers and infants were videotaped in the Ainsworth Strange Situation (Ainsworth, Blehar, Waters, & Wall, 1978). In this procedure, the infant is videotaped in a playroom during a series of eight structured 3-min episodes involving the baby, the mother, and a female stranger. During the observation, the mother leaves and rejoins the infant twice, first leaving the infant with the female stranger, then leaving the infant alone. The procedure is designed to be mildly stressful in order to increase the intensity of activation of the infant's attachment behavior. All videotapes were coded for attachment-related behaviors and for the three attachment classifications as described by Ainsworth et al. (1978) and for disorganized/disoriented behaviors as described by Main and Solomon (1986). Coders were blind to all other data on the families. Attachment classifications (Secure, Avoidant, or Resistant) were assigned both by a computerized multivariate classification procedure (Connell, 1976) and by a trained coder. Agreement between the two sets of classifications was 86%. Seventy-five percent of the disagreed-upon tapes were later found to meet criteria for the Disorganized category. Agreement on the Disorganized classifications between M. Main and a coder from the study staff on 32 tapes was 83%.

Given the current lack of a body of validating research on the Disorganized coding system, attachment behavior was cross-classified both according to the Avoidant, Secure, and Resistant forced classifications and to the Disorganized/Disoriented criteria, yielding four subgroups: Secure, Secure-Disorganized, Insecure, and Insecure-Disorganized. In the Secure-Disorganized pattern, infants preserved the outlines of the secure pattern sufficiently to be classified as securely attached using the original coding system. These infants were distressed by the mother's absence and approached and made contact with her by the second reunion. However, their approach behavior was hesitant or delayed enough to distinguish them from other securely attached infants. Mothers in this subgroup were often unresponsive or hesitant in response to their infants' approaches, creating a very tentative and awkward quality to the reunions. These infants did not show conspicuous ambivalence or rejection of the mother's responses, however.

Insecure-Disorganized infants in this sample were notably angry and rejecting of their mothers at reunion, and often failed to approach them. They were likely to show pointed avoidance, such as backing away from the mother or hugging the opposite wall or crying at the departure of the stranger during reunions, as well as angry noncompliance and rejection of the mother's overtures. The Insecure—Not disorganized category consisted entirely of infants classified as Avoidant. All Resistant infants, two at 12 months and five at 18 months, fell into the Insecure-Disorganized category.

Analysis.—Infants in the high-risk untreated group were predicted to perform less optimally on all measures than treated infant or community infants. In addition, community infants of depressed mothers were expected to perform poorly. Thus, both an overall treatment group effect and a treatment \times depression interaction were predicted. For all interval-level variables, treatment group (3) \times depression (2) ANOVAs followed by Duncan multiple-range tests were performed. Other follow-up analyses of demographic variables are described below.

Results

Infant Mental and Physical Development

There was no main effect of treatment, $F(2,70) = 1.22$, N.S., on infant mental development scores. However, there was a significant effect of depression, $F(1,70) = 4.61$, $p < .05$, modified by a significant interaction effect between treatment and depression, $F(2,70) = 3.74$, $p < .03$, as can be seen in Table 2. Infants of depressed mothers who received treatment achieved significantly higher mental development scores than both groups of infants of depressed mothers who did not receive treatment, Duncan multiple-range test $p < .05$, with treated infants outperforming untreated infants by 11 and 10 points, respectively, or two-thirds of a standard deviation in the normative Bayley sample. As also shown in Table 2, infants of mothers not reporting depression, whether treated or untreated, were attaining mean scores consistent with national norms. Nondepressed low-SES mothers appeared to maintain their infants' mental development at normal levels in the absence of specific intervention. The pattern of scores for physical development was similar but did not reach significance.

Given the nonrandom assignment of subjects to treatments, extensive control analyses were performed to assess whether any demographic differences between groups could account for the pattern of treatment effects. As shown in Table 2, adjusting for the covariance of cumulative demographic risk did not affect the pattern of results, treatment \times depression $F(2,69) = 3.64$, $p < .03$. This is not surprising given the pattern of demographic risk scores. Treated infants of depressed mothers were at *greater* demographic risk than untreated infants of depressed mothers even though their mental development scores were higher. Given the selection and matching procedures, the effect of cumulative demographic risk on mental development was not significant in this very low-income sample, $p < .08$, even though risk scores ranged from 0 to 6. The pattern of treatment effects was also stable when maltreatment and psychiatric hospitalization status were covaried in addition to cumulative demographic risk.

Robustness of the treatment \times depression effect over single demographic variables and their interactions was further evaluated by a series of regression analyses. To increase cell size to allow the evaluation of interaction effects, treatment group was collapsed to two levels (treated/untreated). Eleven three-way hierarchical regressions—treatment (2) \times depression (2) \times demographic (2 or continuous)—were run using each of the 11 demographic variables (education, income, race, age, child sex, birth order, single parent, maternal age at first child, family on government assistance, number of children under 6 years, maternal IQ). In all analyses, after controlling for all main effects and all other two-way interaction effects, the treatment \times depression interaction accounted for 7.2%–13.3% of the variance, mean 9.6%, all $p < .01$. No three-way interaction effects (treatment \times depression \times demographic) approached significance. Over the 11 variables, or 22 demographic subgroups (e.g., male/female, firstborn/late-born, with median splits on continuous variables), MDI scores of treated infants of depressed mothers ranged from 100.6 to 109.0, while MDI scores for the same 22 subgroups of untreated infants of depressed mothers ranged from 86.4 to 98.8. All 22 comparisons favored the treated infants, with subgroup differences ranging from 4.2 to

21.4 points. Thus, the treatment effect was seen among all demographic subgroups in the study.

To evaluate the further possibility that small cumulative effects or interactions among demographic variables might be confounded with the treatment \times depression effect, a second series of four hierarchical regressions were run using arbitrary sets of the three demographic variables in addition to treatment (2) and depression (2) variables. The sets used can be read in order from the above list of 11 demographic variables, with three groups of three and a final group of two. The five main effects and nine two-way interactions were removed before testing the treatment \times depression effect. Cell n 's did not allow the inclusion of three-way interactions involving two demographic variables. The treatment \times depression interaction remained significant in all analyses, $p < .01$.

In addition to differences between treated and untreated groups in mental development at 18 months, there is converging evidence of change *within* the treated group from 12 to 18 months. Twenty-six community infants and 26 treated infants, nine with histories of maltreatment, had MDI data at both 12 and 18 months. At 12 months, risk status was significantly related to MDI scores, with home-visited infants of maltreating mothers having significantly lower MDI scores than community infants of nondepressed mothers, $F(1,27) = 9.85$, $p < .01$, with means of 94.2 and 109.0, respectively. Nonmaltreated infants receiving home-visiting services had an intermediate mean score of 101.2. By 18 months, the difference between maltreated infants and community infants of nondepressed mothers had disappeared, $F(1,27) = .37$, N.S., with means of 107.6 and 110.5, respectively. This improvement in the scores of maltreated infants cannot be accounted for by regression to the mean since the rate of change from 12 to 18 months among maltreated infants receiving treatment was significantly greater than the rate of change among infants of depressed community mothers who did not receive treatment, $F(1,12) = 4.55$, $p < .05$, assessed by comparing 18-month MDI scores after covariance adjustment for 12-month scores as recommended by Cohen and Cohen (1983). The mental development scores of infants of depressed community mothers remained low at both 12 and 18 months, with scores of 88.8 and 92.7 ($n = 6$), respectively.

Infant Attachment Security

The negative effects of social risk status were more pervasive in regard to infant attachment security than in regard to mental development, with the untreated high-risk group as a whole differing significantly both from the treated high-risk group, Mann-Whitney $U = 83.0$, $p < .05$, and from the untreated community group, $U = 96.5$, $p < .05$. Untreated high-risk infants had a very high rate of insecure-disorganized attachment, 60%, compared to 29% for high-risk infants who received treatment and 28% for community infants. These data can be seen in Table 3, cross-classified by maternal depression status.

The generally favorable performance of community infants was modified by the mother's depression status, leading to a significant difference between the treated infants of depressed mothers and all untreated infants of depressed mothers, Mann-Whitney $U = 70.0$, $p < .05$. Untreated infants of depressed mothers exhibited more than twice the rate of insecure-

disorganized behavior exhibited by heated infants of depressed mothers, 54% versus 22%, as also shown in Table 3.

Attachment patterns of maltreated infants remained largely insecure over the the course of intervention, despite their large cognitive gains, with 22% Secure, 11% Secure-D, 22% Insecure, and 44% Insecure-D. Twelve month classifications also yielded 63% Insecure or Insecure-D. The only comparison data available using the Disorganized coding system with maltreated infants of equivalent age are those of Carlson, Cicchetti, Barnett, and Braunwald (1989), who found 81.8% *D* classifications among 22 maltreated infants aged 11–16 months.

One unanticipated finding was the disproportionate number of Secure-Disorganized infants in the treated group. Since the treated group was also the only group containing maltreated infants, it was possible that the secure-disorganized pattern might be associated with the most severe dysfunction rather than with the positive effects of intervention. Therefore, the attachment data were also examined with infants of maltreating or psychiatrically hospitalized mothers excluded to more closely equate the groups for severity of risk. With more severely at-risk infants excluded, the distribution of attachment patterns for treated infants of depressed mothers ($N = 15$) was Secure, Secure-D, 13% Insecure, and 13% Insecure-D. For untreated infants of depressed mothers ($N = 12$), the distribution was 17% Secure, 8% Secure-D, 25% Insecure, and 50% Insecure-D. Thus, the proportion of infants exhibiting the Secure-Disorganized pattern in the treated group was greater among mothers with depression only (33%) than among maltreating mothers (11%), ruling out the possibility that this pattern of behavior was primarily associated with more severe risk. In addition, with the groups more closely equated for risk, the treatment effect was enhanced, with 73% of treated infants but only 25% of untreated infants in the overall secure category, Mann Whitney $U = 45.5$, $P < .025$.

The robustness of the treatment effect across demographic subgroups was assessed by the same series of analyses conducted for mental development scores. Although the four-level attachment variable does not technically meet the interval-level measurement requirements for the regression procedure, both the confirmatory role of these analyses following more conservative ordinal tests for predicted effects and the robustness of the regression procedure to violations of the interval assumption (Cohen & Cohen, 1983) supported its application here. To increase subgroup n , the three untreated at-risk cells (two high-risk cells and one depressed community cell) were collapsed. Eleven treatment (at-risk treated [$n = 28$] vs. at-risk untreated [$n = 17$]) \times demographic (2 or continuous) hierarchical regressions and four regressions that included three demographic variables at a time were computed. The main effect of treatment on attachment security remained significant in all analyses, including the analysis of cumulative demographic risk, after demographic main effects were controlled, all $p < .05$, and no treatment \times demographic interaction effects approached significance. Variance accounted for ranged from 9% to 16%, with a mean of 11%. As for the MDI data, in this sample cumulative demographic risk was only weakly related to attachment security, $p < .07$.

Again, the stability of the treatment effect over the 11 demographic variables was evident from inspection of the data. Over all 22 demographic subgroups examined, proportion

securely attached ranged from .50 to .75 among treated infants and from 0 to .30 among untreated infants.

Maternal behavior and Social Isolation

There were no significant effects of treatment on maternal behavior ratings. Maternal involvement with the toddler at home at 18 months showed no effects of either treatment group or depression: treatment, $F(2,66) = .18$, N.S.; depression, $F(1,66) = 2.50$, N.S.; treatment \times depression, $F(2,66) = 1.66$, N.S. Maternal hostile-intrusive behavior showed no effects of treatment but was strongly related to maternal depression: depression, $F(1,66) = 6.71$, $p < .01$ treatment, $F(2,66) = 1.91$, N.S.; treatment \times depression, $F(2,66) = .01$, N.S. Mean maternal behavior scores are shown in Table 4.

Several post-hoc analyses were carried out to explore hypotheses regarding the absence of treatment effects on maternal behavior at 18 months. None of these analyses yielded a clear explanation. Individual rating scales yielded the same findings as the factor scores. Demographic factors were not masking any treatment effects, assessed through the same series of demographic analyses conducted on the mental development data. Excluding the maltreating subgroup from the treated group also did not yield treatment differences. Table 4 also displays the most extensively adjusted means to indicate the range of values seen in control analyses. This absence of differences is considered further in the discussion section.

Mothers' contacts with friends and relatives in the 5 days preceding the 18-month assessment also showed an interaction effect between treatment group and maternal depression: & treatment group, $F(2,68) = .23$, N.S.; depression, $F(1,68) = .13$, N.S.; treatment \times depression, $F(2,68) = 6.14$, $p < .01$; but the effect was of a different form than the interaction effect on infant mental development. Among nondepressed mothers, mothers who received treatment were significantly less social than either group of untreated mothers, all $p < .05$, with a mean of 14.1 for treated nondepressed mothers, and means of 36.3 and 26.3 for nondepressed mothers in the untreated high-risk and community groups, respectively. Among depressed mothers, the means were in the predicted direction, with a mean of 28.0 for treated depressed mothers and means of 8.2 and 17.5 for untreated depressed mothers in the high-risk and community groups, respectively. These differences among depressed mothers failed to reach significance, however.

Again, follow-up analyses were conducted to see if the failure of the prediction could be better understood. Neither demographic factors nor the presence of the maltreating subgroup could account for the findings, assessed by the same series of analyses described for maternal behavior.

Time in Treatment

An independent source of evidence regarding treatment effects was available from within-group analyses of treatment time. For the treated group, maternal behavior assessments were conducted at both 12 and 18 months so both data sets were analyzed. Because infants entered the study between 0 and 9 months of age, total time in treatment at 18 months varied from 9 to 18 months. At 12 months, time in treatment varied from 3 to 12 months.

Analyses of variance first confirmed that there were no associations between time in treatment and the three major infant-risk variables: infant maltreatment, $F(1,30) = .15$, N.S.; maternal psychiatric hospitalization, $F(1,30) = 1.63$, N.S.; and maternal depression, $F(1,30) = 1.53$, N.S. Because all of these risk variables accounted for variance in outcome independently of treatment time, partial correlations between treatment time and maternal behavior were computed with effects of these variables removed.

As can be seen in Table 5, the mother's involvement with her infant at 12 months was significantly related to the number of months of home visiting provided. Increases in service time from 3 to 12 months accounted for 24% of the unexplained variance in the involvement of high-risk mothers with their infants at 1 year of age. Variation in 18-month treatment time, which ranged from 9 to 18 months, was no longer related to variation in maternal behavior. As can be seen, the aspects of maternal behavior most strongly associated with treatment were rate of verbal communication, quantity of comforting touch, and maternal warmth.

To rule out any demographic confounds, 15 regressions were computed for each dependent variable, 12 controlling for each demographic variable, including cumulative demographic risk, and its interaction term and four controlling for demographic variables at a time, as described for mental development scores. All findings remained as reported, with partial correlations between maternal involvement and service time at 12 months ranging from .36 to .38, all $p < .05$. With the three major risk variables also covaried, partial correlations ranged around .46, $P < .01$.

Time in treatment at 12 and 18 months was less closely tied theoretically to other maternal and infant outcome measures, and none of these analyses was significant. Partial correlations between service time and infant mental development at 12 and 18 months were not significant, partial r 's = $-.14$ and $-.18$, respectively. ANCOVAs for linear trends in service time \times infant attachment classification also did not approach significance at 12 or 18 months, $F(1,22) = .17$, N.S., $F(1,24) = .15$, N.S., respectively. Maternal social contacts at 18 months were not significantly correlated with service time, before or after covariate adjustments, partial $r = -.10$.

Discussion

The results of the study support the conclusion that developmentally oriented home-visiting services can have a significant impact on the early development of infants at severe social risk. At 18 months of age, infants of depressed mothers who received home-visiting services outperformed unserved infants of depressed mothers by a mean of 10 points, or two-thirds of a standard deviation, on the Bayley Mental Development Index and were twice as likely to be classified as securely attached in their relationships with their mothers, 61% compared to 23%. These differences occurred in the context of an average of 13 months of home-visiting services involving 46 completed home visits. Thus, the results indicate that a home-visiting program with concerted outreach and a strong social service component, in addition to a focus on the mother-infant relationship, can have appreciable benefits for infants in social jeopardy.

It is important to note that the services being evaluated were very involved in the local community and had been providing services within the community for several years prior to the onset of the research protocol. Therefore, the programs evaluated were in their prime rather than in the process of discovering how to manage the variety of problems that attend home visiting with multirisk families. The mothers and infants served included the full range of socially at-risk infants known to service agencies in the community during the period. Thus, the findings concern the effectiveness of intervention services for the heterogeneous group of mothers and infants likely to present to an urban intervention service with a mandated treatment area.

Why were the effects associated with intervention most consistent among infants of depressed mothers? Intervention effects were more consistently demonstrated for infants of depressed mothers primarily because the *untreated* infants of depressed mothers did so poorly. Untreated at-risk infants of nondepressed mothers were fewer in number and stronger in cognitive performance, so the need for intervention was less clearly established among infants of poor but nondepressed mothers. Madden et al. (1984) also found that socioeconomic risk factors alone constituted insufficient criteria for predicting slowed cognitive growth among toddlers. In other recent intervention efforts, positive cognitive effects have been most evident among infants with social risk factors beyond low SES alone (Olds, Henderson, Chamberlin, & Tatelbaum, 1986; Ramey, Yeates, & Short, 1984). Therefore, insuring that all infants participating in intervention studies are likely to suffer unfavorable developmental outcomes without treatment is crucial to demonstrating positive benefits of intervention. Findings from the present study suggest that current maternal depression, history of psychiatric hospitalization, and child maltreatment, in addition to low SES, are much more specific predictors of unfavorable infant social and cognitive development.

The current findings go beyond the results of earlier studies in demonstrating the impact of intervention services on the infant-mother attachment relationship, thus beginning to build evidence for the simultaneous impact of intervention on the social as well as cognitive development of infants at risk. In this sample, the attachment relationship was more broadly vulnerable than mental development to the detrimental effects of social risk factors, with untreated high-risk infants of nondepressed mothers also showing high rates of the angry, rejecting behaviors characteristic of the Insecure-Disorganized pattern. However, the magnitude of the intervention effect was similar for cognitive and social domains. This positive social effect of intervention suggests that the Inter social and motivational benefits noted in follow-up studies (Lazar & Darlington, 1982) may be mediated in part by early effects of intervention on the primary attachment relationship.

What are the potential threats to the validity of these conclusions? The major caveat to be observed in interpreting the results of the study is that nonrandomly constituted groups were being compared. Without random assignment, the possibility cannot be ruled out that in some way the mothers who received treatment were more motivated or available to improvement than mothers in the untreated groups, and that the observed group differences were due to the more favorable composition of the treated group rather than to treatment itself.

In the present study, the distribution of cumulative demographic and functional risk works against this possibility. The treated group clearly incurred substantial risks of compromised development, greater than the risks incurred in the untreated groups, particularly in relation to the significantly greater proportion of maltreating mothers in the treated group (32%). The developmental effects associated with infant maltreatment have been documented by others (Carlson et al., 1989; Crittenden, 1985; Egeland & Sroufe, 1981) and were documented again in the 12-month assessment data from the present study. Thus, any hypothesis regarding positive selection into the treated group must be weighed against the slightly higher demographic risk scores of this group and the demonstrated presence of a significantly higher proportion of maltreating families receiving treatment

The great difficulties encountered by the home visitors in following up on service providers' referrals and making alliances with many of the home-visited mothers also weighs against the differential motivation hypothesis. These difficulties have been described in more detail in an earlier descriptive report (Lyons-Ruth, Botein, & Grunebaum, 1984). The mothers who received services required the high level of outreach and patient trust building described by others as needed by the most at-risk segments of the low-income population (Alexander, 1972; Bronfenbrenner, 1974). The maltreating subgroup of families were also the families most in crisis at the time of referral, with two infants hospitalized for failure to thrive, two families with older children in foster care, and two infants in temporary custody of the state. None of the untreated families were having this level of difficulty.

A second potential threat to the validity of the results is the possibility that the poor outcomes observed among the *untreated* at-risk were due to sampling bias. This is an important concern, especially in relation to samples recruited through clinical referral, since many factors could operate to produce bias in either direction. The most important safeguard against this threat to validity was the replication of the poor outcomes for untreated infants across two very differently constituted groups, which makes it unlikely that particular aspects of a single recruitment process led to biased results. The further extensive analyses to detect any confounding of treatment effects with demographic effects greatly reduces the possibility that demographic factors associated with group status could explain the observed developmental differences between treated and untreated groups.

If the treatment effects are assumed to be valid, how can the changes in infant mental development and attachment behavior be accounted for theoretically in the absence of clear treatment group differences in maternal behavior? The maternal assessment procedure was carefully targeted to provide sensitive and reliable indices of those maternal behaviors found in previous literature to relate to infant mental development and security of attachment. Prior analyses of the 12-month data have confirmed significant relationships between involvement and mental development and between maternal hostility and insecure infant attachment behavior (Lyons-Ruth, Connell, Zoll, & Stahl, 1987; Lyons-Ruth, Zoll, Connell, & Grunebaum, 1986). Therefore, the maternal behaviors relevant to infant outcome appear to have been adequately assessed at 12 months. The present analyses further demonstrated that at 12 months maternal warmth and verbal communication were significantly related to treatment time, in accord with the overall intervention model.

The maternal assessments continued to yield reliable associations with other variables at 18 months within the lower-risk community group, but not within the high-risk groups, despite adequate score variability, which suggests that the absence of treatment-group differences in maternal behavior was part of a wider difficulty in identifying the organizing features of maternal behavior at 18 months among the most deviant mothers.

The patterning of maternal behavior at 18 months by treatment and depression indicated that depressed mothers may be either extremely withdrawn and nonhostile or quite hostile and actively engaged. Certain other depressed mothers were noted to be both overtly responsive and nonhostile but entirely devoid of affect, responding with blank faces and monotone voices. Group means may not adequately represent the variety of parental adaptations to high-stress environments or their potentially contrasting directions of change with treatment. Such individualized patterns of nonoptimal parenting behavior may become more pronounced as the toddlers' behaviors become more active and differentiated at 18 months and/or parenting responses may become less stable during this period as maternal behavior is being reorganized to respond to the new initiatives of the toddler. A more individualized and organizational approach to the assessment of maternal behavior patterns, modeled after the assessment of infant attachment patterns, may be needed in high-risk studies.

The low number of maternal social contacts among nondepressed treated mothers was also difficult to interpret. Based on clinical knowledge of the home-visited families, it was apparent that some nondepressed mothers with serious parenting difficulties, including 27% maltreating mothers in the nondepressed group, relied heavily on denial to cope with their stressful situations, leading them to minimize their subjective distress both on the depression scale and in their daily interactions. Although these mothers did eventually establish productive alliances with their home visitors and, apparently, with their extensive use of denial may particularly interfere with adult peer relationships. Other studies have shown that both maltreating mothers and mothers with psychotic disorders earn elevated scores on measures of denial (Cohler, Grunebaum, Weiss, Hartman, & Gallant, 1976; Starr, 1982). The inclusion of scales assessing denial would be a useful addition to future studies of very high-risk samples to evaluate this possibility. Since, in the treated group, infants had similar outcomes regardless of maternal depression status, the potential denial of some maltreating mothers does not affect the conclusions to be drawn from the pattern of treatment results.

The pattern of developmental outcomes observed in this study, then, provides a strong argument for continued support of randomized intervention studies targeted toward the poor, multirisk, depressed, and maltreating mothers at issue in Bronfenbrenner's earlier report. Developmentally oriented parenting support programs continue to hold promise for the most socially and psychiatrically at-risk infants and their families.

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References

- Ainsworth MDS, Bell SM, & Stayton DJ (1971). Individual differences in Strange Situation behavior of 1-year-olds In Schaffer HR (Ed.), *The origins of human social relations* (pp. 17–57). New York: Academic Press.
- Ainsworth MDS, Blehar M, Waters E, & Wall S. (1978). *Patterns of attachment*. Hillsdale, NJ: Erlbaum.
- Alexander H. (1972). The social worker and the family In Kempe CH & Helfer RE (Eds.), *Helping the battered child and his family* (pp. 22–40). Philadelphia: Lippincott.
- Bronfenbrenner U. (1974). A report on longitudinal evaluation of preschool programs: Vol. 2. Is early intervention effective? (HEW Publication No. OHD 74–25). Washington, DC: HEW.
- Brown GW, & Rutter ML (1966). The measurement of family activities and relationships: A methodological study. *Human Relations*, 19, 241–263.
- Bryant DM, & Ramey CT (1987). An analysis of the effectiveness of early intervention programs for environmentally at-risk children In Guralnick M. (Ed.), *The effectiveness of early intervention for at-risk and handicapped children* (pp. 33–78). New York: Academic Press.
- Carlson V, Cicchetti D, Barnett D, & Braunwald KG (1989). Finding order in disorganization: Lessons from research on maltreated infants' attachments to their caregivers In Cicchetti D. & Carlson V. (Eds.), *Child maltreatment: Theory and research on the causes and consequences of maltreatment* (pp. 494–528). New York: Cambridge University Press.
- Cohen J, & Cohen P. (1983). *Applied multiple regression correlation analysis for the behavioral sciences*. Hillsdale, NJ: Erlbaum.
- Cohler BJ, Grunebaum HU, Weiss JL, Hartman CR, & Gallant DH (1976). Child care attitudes and adaptation to the maternal role among mentally ill and well mothers. *Orthopsychiatry*, 46, 123–134.
- Connell DB. (1976). Multivariate classifier for the Ainsworth Strange Situation. Unpublished manuscript.
- Crittenden PM (1981). Abusing, neglecting, problematic and adequate dyads: Differentiating by patterns of interaction. *Merrill-Palmer Quarterly*, 27, 201–218.
- Crittenden PM (1985). Maltreated infants: Vulnerability and resilience. *Journal of Child psychology and Psychiatry and Allied Disciplines*, 26, 85–96.
- Egeland B, & Sroufe LA (1981). Developmental sequelae of maltreatment in infancy, In Rizley R. & Cicchetti D. (Eds.), *Developmental perspectives in child maltreatment* (Vol. II, pp. 77–92). San Francisco: Jossey-Bass.
- Fraiberg S. (Ed.). (1980). *Clinical studies in infant mental health*. New York: Basic.
- Husaini BA, Neff TA, Harrington JB, Hughes MD, & Stone RH (1980). Depression in rural communities: Validating the CESD scale. *Journal of Community Psychology*, 8, 20–27.
- Lazar I, & Darlington R. (1982). Lasting effects of early education: A report from the Consortium for Longitudinal Studies. *Monographs of the Society for Research in Child Development*, 47(2–3, Serial No. 195).
- Lyons-Ruth K, Botein S, & Grunebaum H. (1984). Reaching the hard-to-reach: Serving multirisk families with infants in the community In Cohler BJ & Musick JS (Eds.), *Intervention with psychiatrically disabled parents and their young children* (pp. 95–122). (New Directions for Mental Health Services, no. 24). San Francisco: Jossey-Bass, 1984.
- Lyons-Ruth K, Connell D, Zoll D, & Stahl J. (1987). Infants at social risk: Relations among infant maltreatment, maternal behavior, and infant attachment behavior. *Developmental Psychology*, 23, 223–232.
- Lyons-Ruth K, Zoll D, Connell D, & Grunebaum H. (1986). The depressed mother and her one-year-old infant: Environmental context, mother-infant interaction and attachment, and infant development In Tronick E. & Field T. (Eds.), *Maternal depression and infant disturbance* (pp. 61–82). San Francisco: Jossey Bass.

- Lyons-Ruth K, Zoll D, Connell D, & Odom R. (1987, 4). Maternal depression as mediator of the effects of home-based intervention services. Paper presented at the biennial meeting of the Society for Research in Child Development, Baltimore, MD.
- Madden J, O'Hara J, & Levenstein P. (1984). Home again: Effects of the mother-child home program on mother and child. *Child Development*, 55, 636–647. [PubMed: 6723452]
- Main M, & Solomon J. (1986). Discovery of an insecure disorganized/disoriented attachment pattern In Brazelton TB & Yogman MW (Eds.), *Affective development in infancy* (pp. 95–124). Norwood, NJ: Ablex.
- Olds DL, Henderson CR, Chamberlin R, & Tatelbaum R. (1986). Preventing child abuse and neglect: A randomized trial of nurse home visitation. *Pediatrics*, 78, 1. [PubMed: 3487770]
- Radioff LS (1977). CES-D scale: A selfreport depression scale for research in the general population. *Applied Psychological Measurement*, 1, 385–401.
- Ramey C, Yeates K, & Short E. (1984). The plasticity of intellectual development: Insights from preventive intervention. *Child Development*, 55, 1913–1925. [PubMed: 6510061]
- Rutter M. (1979). Protective factors in children's responses to stress and disadvantage In Kent MW & Rolf TW (Eds.), *Social competence in children* (pp. 49–74). Hanover, NH: University Press of New England.
- Rutter M., Yule B, Quinton D, Rowlands O, Yule W, & Berger M. (1975). Attainment and adjustment in two geographical areas: III. Some factors accounting for area differences. *British Journal of Psychiatry*, 126, 520–533. [PubMed: 1174769]
- Sameroff AJ, & Chandler MJ (1975). Reproductive risk and the continuum of caretaking casualty In Horowitz FD (Ed.), *Review of child development research* (Vol. 4, pp. 187–244). Chicago: University of Chicago Press.
- Sameroff AJ, Seifer R, Barocas B, Zack M, & Greenspan S. (1987). IQ scores for 4-year-old children: Social-environmental risk factors. *Pediatrics*, 79,343–350 [PubMed: 3822634]
- Schweinhart LJ, & Weikart DB. (1980). *Young children grow up: The effects of the Perry Preschool Program on youths through age 15*, Ypsilanti, MI: High/Scope Educational Research Foundation.
- Starr RH (1982). A research-based approach to the prediction of child abuse In Starr RH (Ed.), *Child abuse prediction: Policy implications* (pp. 105–134). Cambridge, MA: Ballinger, 1982.
- Wechsler D. (1955). *Wechsler Adult Intelligence Scale manual*. New York: Psychological Corp.
- Weissman MM, Sholomskas D, Pottenger M, Prusoff BA, & Locke BZ. (1977). Assessing depressive symptoms in five psychiatric populations: A validation study. *American Journal of Epidemiology*, 106, 203–214. [PubMed: 900119]
- Zigler E, & Trickett PK (1978). IQ, social competence, and evaluation of early childhood education programs. *American Psychologist*. 33, 789–798.

TABLE 1

RISK AND DEMOGRAPHIC CHARACTERISTICS OF THE SAMPLE

Maternal Risk and Demographic Characteristics	High-Risk Treated (31)	High-Risk Untreated (10)	Community Untreated (35) ^a
Depressed (%)	64.5	60.0	22.9 ^b
Maltreating (%)	32.3	.0	.0
Ever psychiatrically hospitalized (%)	31.3	30.0	.0
High school graduate (%)	58.1	60.0	53.0 ^c
Mean weekly income (\$ per person)	45.99	43.95	46.98
Nonwhite mother (%)	16.1	40.0	14.3
Mean maternal age (years) ...	25.6	21.8	24.8
Male infant (%)	51.6	80.0	57.1
Firstborn infant (%)	38.7	80.0	40.0

^aCommunity-group subjects were individually matched to high-risk subjects on the six demographic variables.

^bGroup \times risk $\chi^2(2, N = 76)$, all $p < .0001$.

^cGroup \times demographic F or χ^2 values, all N.S.

TABLE 2
BAYLEY MENTAL DEVELOPMENT INDEX AT 18 MONTHS BY TREATMENT GROUP AND MATERNAL DEPRESSION

Depression Status	High-Risk Treated Infants	High-Risk Untreated Infants	Community Untreated Infants
Full sample:			
Mean	103.10 (31)	97.10 (10)	106.51 (35)
SD	13.38	11.32	13.47
Adjusted mean ^a	103.81	97.54	105.76
CD risk score ^b	3.35	3.20	2.51
Nondepressed:			
Mean.....	101.45(11)	103.75 (4)	110.11 (27)
SD	16.78	13.50	12.10
Adjusted mean	101.74	103.81	109.44
CD risk score	3.18	3.00	2.41
Depressed:			
Mean.....	104.00 (20)	92.67 (6)	94.38 (8)
SD	11.49	7.89	10.91
Adjusted mean	104.62	93.14	94.28
CD risk score	3.45	3.33	2.88

NOTE.—Cell *n*'s in parenthesis.

^aMean adjusted for cumulative demographic risk score.

^bCumulative demographic risk score.

TABLE 3.

INFANT ATTACHMENT CLASSIFICATIONS BY TREATMENT GROUP AND DEPRESSION STATUS

Depression Status	High-Risk Treated (28) ^a	High-Risk Untreated (10)	Community Untreated (32) ^a
Nondepressed mothers:			
Forced B classification:			
Secure-Not Disorganized .	.30 (3)	.00	.48 (12)
Secure-Disorganized .....	.20 (2)	.00	.08 (2)
Forced A or C classification:			
Insecure .....	.10(1)	.50 (2)	.20 (5)
Insecure-Disorganized ....	.40 (4)	.50 (2)	.24 (6)
Depressed mothers:			
Forced B classification:			
Secure-Not Disorganized .	.33 (6)	.17(1)	.14(1)
Secure-Disorganized .....	.28 (5)	.17(1)	.00
Forced A or C classification:			
Insecure .....	.17(3)	.00	.43 (3)
Insecure-Disorganized ....	.22 (4)	.67 (4)	.43 (3)

NOTE.—Cell *n*'s in parentheses.^aFour tapes originally classified as secure, three from the treated group and one from the community group, could not be recoded for the Disorganized category and are not included.

TABLE 4.

MATERNAL BEHAVIOR BY TREATMENT GROUP AND DEPRESSION

TREATMENT GROUP	MATERNAL DEPRESSION STATUS AND MATERNAL BEHAVIOR			
	Nondepressed		Depressed	
	Involvement	Hostile Intrusiveness	Involvement	Hostile Intrusiveness
High-risk treated .....	.15	-.02 (11)	-.07	.61 (19)
Adjusted ^a .....	.18	-.13	-.03	.41
High-risk untreated	-.13	-.16 (4)	.09	.44 (6)
Adjusted	-.38	-.16	.13	.53
Community untreated .....	.22	-.54 (27)	-.87	.15(5)
Adjusted .....	.22	-.41	-.87	.28

NOTE.—All scores are standardized factor scores. Cell *n*'s in parenthesis.

^aMeans adjusted for cumulative demographic risk, maltreatment, and psychiatric hospitalization.

TABLE 5
 PEARSON CORRELATIONS BETWEEN TIME IN INTERVENTION AND MATERNAL BEHAVIOR AT 12 AND 18 MONTHS

MATERNAL BEHAVIOR	12 MONTHS		18 MONTHS	
	Raw r ($df = 27$)	Partial r^a ($df = 22$)	Raw r ($df = 30$)	Partial r^a ($df = 25$)
Involvement factor .....	.36*	.49**	-.18	-.09
Sensitivity .....	.24	.31	-.28	-.24
Warmth .....	.33*	.45*	-.18	-.13
Disengagement	-.40*	-.51**	.11	-.02
Verbal communication . . . .	.41*	.56**	-.19	-.11
Quantity of comforting touch . . . .	.33*	.51**	.04	.05
Quality of comforting touch . . . .	.17	.21	-.17	-.19
Quantity of caretaking touch . . . .	.20	.18	-.01	.01
Anger	-.28	-.30	-.13	-.06

^a Adjusted for maternal depression, psychiatric hospitalization, and maltreatment status.

* $p < .05$.

** $p < .05$.