

## Relationship of Maternal Behavioral Style to the Development of Organically Impaired Mentally Retarded Infants

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The relationship of maternal behavioral style to the cognitive developmental status of 60, 1-, 2-, and 3-year-old organically impaired, mentally retarded children was investigated. Eighteen global maternal behaviors and four child behaviors were rated on a 10-minute video tape of mother-child play. A factor analysis of the maternal behavioral items revealed three major parameters of behavior. Child-Oriented/Maternal Pleasure was related positively, whereas Quantity of Stimulation and Control were related negatively to Children's Bayley Mental Development scores. Maternal behavioral style was not related to either the ratings of the children's behavior or to the children's current health status and family SES, but was related to the amount of time children had been in intervention programs. Findings were discussed in terms of their implications for intervention with mothers and their retarded infants.

This study was designed to investigate the relationship of different styles of maternal interaction to the rate of development achieved by organically impaired, mentally retarded infants. We attempted to identify patterns of maternal behavior that are related to different levels of children's development, rather than to determine whether there are differences in the manner that mothers interact with their children compared to mothers with nonretarded children (i.e. Berger & Cunningham, 1983; Eheart, 1982; Petersen & Sherrod, 1982; Stoneman, Brody, & Abbott, 1983). This investigation was based upon the assumption that there are substantial individual differences in the manner in which mothers interact with retarded children, and we attempted to determine whether these differences are related to variability in children's development.

There is considerable evidence that the rate of cognitive, social, and language de-

velopment of normally developing children is related to several parameters of maternal behavior. One group of behavior constitutes a pattern of child-oriented maternal interaction. Maternal involvement (Elardo, Bradley, & Caldwell, 1975), warmth and affection (Stern et al., 1969; Yarrow, 1963), contingent responsiveness (Donovan & Leavitt, 1978; Lewis & Goldberg, 1969) and sensitivity to children's state (Bell & Ainsworth, 1972; Clarke-Stewart, 1973) have all been linked to several indices of children's competence. Sensitivity to children's interests, appropriate teaching (Brophy, 1970; Hess & Shipman, 1965) and encouragement of achievement (McCall, 1979) have also been associated positively with children's learning. The amount of stimulation provided by mothers has also been related to children's competence, with caregivers who engage frequently in social interaction having children who perform better on later developmental tests (Beckwith et al., 1976; Carew, 1980). Clarke-Stewart (1973) reported that children's competence was related to the frequency that mothers looked, spoke, and

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played with their children. Another significant influence on children's development appears to be the manner in which mothers control their children. Baumrind (1967, 1971) reported that parents of highly competent preschoolers were firm and consistent in their demands, but neither overly restrictive nor permissive. Clarke-Stewart (1973), Ainsworth and Bell (1975), and Bayley and Schaefer (1964) all reported negative correlations between maternal restrictiveness, punishment, and intrusiveness with children's later performance on tests of cognitive abilities.

In this investigation the quality of mothers' behavior during a 10-minute videotaped mother-child play session was rated on 18 global behavior items that had been adapted from the literature on maternal behavioral style. These ratings were then related to children's Bayley mental development scores as well as to ratings of the children's behavior during the session. We predicted that the maternal behavioral style of these mothers would relate significantly to the level of mental functioning of their retarded children in a manner corresponding to the relationships that have been reported for mother-nonretarded child dyads.

### Method

#### Subjects

The sample included 60 mother-child dyads in which the children had been diagnosed as having medical or physiological conditions commonly associated with mental retardation (Grossman, 1973), but who did not have other major physical or sensory impairments. Ninety percent of the children had various forms of Down syn-

drome, and the remaining children had conditions such as William syndrome and hydrocephaly. Subjects were recruited through a variety of resources, including parent groups, newborn clinics, and infant intervention programs. Approximately 70% of the sample came from the Los Angeles area, whereas the remainder of the sample came from the Chicago area. Data were collected over a 3-year period, between 1977 and 1980.

Table 1 lists several demographic characteristics of the sample. There were equal numbers of 12-, 24-, and 36-month-old children, of whom 57% were boys and 43% were girls. Most of the sample could be classified as middle class according to the Hollingshead Four Factor Index (1978). Sixty percent of the mothers were Caucasian, 95% were married, and 68% were homemakers.

#### Procedure

Data were collected by two research assistants in the homes of the subjects on one day that was divided into a morning and afternoon session. In the morning the child and mother were given time to become acquainted with the examiners. Then the Bayley Mental Development Index was administered to the child. In the afternoon the mother and child were video taped while playing together on their living room floor. The subjects were instructed to play in any manner they chose but to use only toys provided by the examiners: a xylophone, wooden blocks, stacking rings, nesting blocks, pull toy, picture books, toy bus with moveable wooden figures, and play stove.

TABLE 1  
MEANS AND SDs BY CHILDREN'S AGE GROUPS FOR DEMOGRAPHIC CHARACTERISTICS

Characteristic	1 year		2 years		3 years		Total sample	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Child's CA (months)	12.55	0.51	24.50	1.00	36.90	1.21	24.65	10.07
Bayley DA <sup>a</sup>	7.25	1.36	15.10	2.61	19.30	2.96	13.88	5.57
Mother's CA (years)	31.15	4.97	31.00	6.77	37.25	8.03	33.13	7.22
Mother's education (years)	13.75	1.86	12.95	1.88	13.50	2.16	13.40	1.97
SES (Hollingshead)	41.40	13.69	40.70	12.41	45.65	14.60	42.58	13.55

Note. *N* = 20 for each age group.

<sup>a</sup> Developmental age.

Each video tape was rated independently by two raters who had received 50 hours of training. The rating scale consisted of 18 global maternal behavior items and 4 child behavior items that had been adapted from rating scales reported on previously in the literature (Ainsworth, 1966; Clarke-Stewart, 1973; Yarrow, Rubenstein, & Pedersen, 1973). Immediately after viewing the first 10 minutes of the video tapes, the raters scored each of the 22 items on a 5-point Likert Scale. When raters disagreed on the value assigned to an item, they discussed the item and arrived at a consensus rating. Interrater reliability, as estimated with the Pearson correlation coefficients for the 22 items, was .76 immediately after training and .81 on a random sample of 15 dyads. Percentage agreement within one scale point ranged from 93 to 100% for all 22 items. This level of reliability is consistent with the range of reliability reported for global rating scales (e.g., Clarke-Stewart, 1973).

## Results

The mean ratings of maternal behavior are presented in Table 2. Most items had ratings that fell within the middle range of the 5-point scale (2.78 to 3.75). Four items (responsivity, degree of comfort, effectiveness, and patience) had high average ratings (3.95 to 4.15), whereas only one item (physical stimulation) had a low average rating (1.62). A multivariate analysis of variance (Hull & Nie, 1981) was used to analyze group differences on maternal ratings. Age effects for each of the items were analyzed by univariate analyses of variance and Duncan's Multiple Range tests. The Hotelling's trace test indicated a significant multivariate effect attributable to groups,  $F(36, 74) = 1.91, p < .009$ . The univariate analyses indicated that mothers of 1-year-olds were more physical,  $p < .05$ , but less sensitive to their children's interests and state and taught less appropriately than did mothers of 2- and 3-year-olds,  $p <$

TABLE 2  
MEAN GLOBAL RATINGS AND SDs ON THE MATERNAL AND CHILD BEHAVIORAL ITEMS

Behavioral style	1 year		2 years		3 years		Total sample		F
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	
<b>Maternal behavior</b>									
Expressiveness	3.50	1.05	3.70	0.86	4.00	0.73	3.73	0.90	1.15
Enjoyment	3.05	1.15	3.15	1.04	3.75	0.85	3.32	1.05	2.09
Warmth	3.55	1.15	3.35	1.09	3.55	0.60	3.48	0.97	0.57
Sensitivity to child interest	2.35	0.75	3.30	1.17	3.70	1.13	3.12	1.17	7.9**
Sensitivity to child state	3.00	1.12	3.85	1.14	4.20	0.77	3.68	1.13	5.97**
Responsivity	3.47	1.12	4.00	1.15	4.50	0.61	4.00	1.06	4.80**
Achievement orientation	3.95	0.89	3.65	0.75	3.65	0.75	3.75	0.79	1.15
Appropriate teaching	3.20	1.24	3.80	0.89	4.20	0.62	3.73	1.02	5.16**
Inventiveness	3.30	0.98	3.35	0.67	3.20	0.41	3.28	0.72	0.13
Physical stimulation	2.15	1.39	1.40	0.68	1.30	0.57	1.62	1.01	4.21*
Social stimulation	3.45	0.94	3.30	1.26	3.75	0.97	3.50	1.07	1.90
Playfulness	2.90	1.12	3.40	0.99	3.79	0.85	3.36	1.05	3.34*
Degree of comfort	3.80	0.95	3.95	1.28	4.25	0.79	4.00	1.03	0.98
Effectiveness	3.55	1.10	4.05	0.82	4.25	0.72	3.95	0.93	2.48
Approval	2.75	1.07	2.70	0.66	2.90	0.85	2.78	0.87	0.68
Permissive	2.45	0.76	3.15	1.14	3.50	0.95	3.03	1.04	5.23
Patience	4.05	1.00	4.00	0.79	4.40	0.68	4.15	0.84	1.28
Directiveness	3.95	0.69	3.55	0.89	3.65	0.93	3.72	0.85	1.22
<b>Child behavior</b>									
Activity level	3.00	0.46	3.45	0.67	3.60	0.50	3.35	0.61	6.26**
Attention span	3.10	0.55	3.35	0.75	4.05	0.76	3.50	0.79	10.13**
Enjoyment	2.75	0.64	3.15	0.75	3.50	0.69	3.13	0.75	5.88**
Expressiveness	3.05	0.83	3.35	0.75	3.45	0.76	3.28	0.78	1.43

\*  $p < .05$ . \*\*  $p < .01$ .

.01, whereas mothers of 2- and 3-year-olds did not differ on these variables; mothers of 3-year-olds were more responsive, permissive,  $p < .01$ , and played more appropriately than did mothers of 1-year-olds,  $p < .05$ .

The average ratings for the four child behavior items were slightly above the midpoint of the 5-point scale (3.13 to 3.50, see Table 2). The Hotteling's trace test indicated a significant multivariate age effect for this scale,  $F(98, 108) = 4.81, p < .001$ . The univariate analyses indicated that 2- and 3-year-olds were more active than were 1-year-olds,  $p < .01$ ; 3-year-olds were more attentive than were 1- and 2-year-olds,  $p < .001$ ; and 3-year-olds enjoyed the interaction with their mothers more than 1-year-olds did,  $p < .01$ .

The 18 maternal behavior items were factor analyzed to reduce them to a smaller set of variables. A principle axis procedure was used for extracting the factors. The resulting factors had a Kaiser's Statistic of .96 and accounted for 72% of the variance. Because 12 of the 18 items loaded highly on the first factor, this solution was rotated using a varimax procedure. The rotated solution yielded three orthogonal factors (Table 3). Factor 1 loaded highest on items that reflected the orientation of mothers toward their children, as well as the mother's apparent pleasure and enjoyment. Child-oriented items included sensitivity to child's state, responsivity, and playfulness, whereas maternal pleasure was reflected in the items comfort and enjoyment. Factor 1 was identified as Child Oriented/ Maternal Pleasure. Factor 2, which loaded highest on items reflecting the quantity of maternal stimulation, including physical stimulation, social stimulation, expressiveness, and inventiveness, is referred to as Quantity of Stimulation. Factor 3, which is referred to as Control, loaded positively on directiveness and achievement orientation and negatively on sensitivity to child's interests and permissiveness.

For each subject scores were derived for the three maternal factors. A least-squares regression was used to estimate the relationship between these maternal factors and children's developmental status as

TABLE 3  
FACTOR ANALYSIS OF MATERNAL BEHAVIOR  
RATING SCALE

Maternal behavior	Factor 1	Factor 2	Factor 3
Effectiveness	.84	—	—
Sensitivity to child's state	.82	—	-.43
Degree of comfort	.79	—	—
Appropriate teaching	.73	—	—
Enjoyment	.73	.51	—
Responsivity	.72	—	-.34
Playfulness	.64	.57	—
Approval	.62	.28	—
Warmth	.39	.79	—
Physical stimulation	—	.78	—
Social stimulation	.43	.73	—
Inventiveness	.31	.67	—
Expressiveness	.40	.65	—
Patience	.46	.54	-.49
Directiveness	—	—	.88
Permissiveness	.30	—	-.88
Sensitivity to child's interests	.41	—	-.79
Achievement orientation	.43	—	.67

Note. Factor 1 = Child-Oriented/Maternal Pleasure, Factor 2 = Quality of Stimulation, and Factor 3 = Control.

measured by the Bayley Mental Development Index. Because the conversion tables for determining Mental Development Index did not include scores below 50 or scores for children older than 30 months, a ratio Mental Development Index was calculated for each of the subjects. These scores were then converted to standard scores by age group, so that each age group would have a mean of zero and an *SD* of one. This procedure enabled us to combine Bayley scores so that children's ranking in their own age group would be proportionally equivalent to their ranking in the total sample.

The regression model used for estimating the variability in Bayley scores that was related to the maternal factors included the three maternal factors and two dummy grouping variables. Because the grouping variables could not account for variability in Mental Development Index due to the standardization procedure, the resultant  $R^2$  for this equation indicates the magnitude of the relationship between the maternal factors and Mental Development Index (Kerlinger & Pedhazur, 1973). As indicated in Table 4, the results of this equation were

significant, with the maternal factors accounting for 23% of the variance of Mental Development Index. The partial correlations, which reflect the simple correlation of each independent variable to Mental Development Index with the linear effect of all other independent variables removed, indicated that Factor 1 correlated positively with Mental Development Index, and that Factors 2 and 3 correlated negatively with Mental Development Index, although only the relationship with Factor 3 was significant.

TABLE 4  
MULTIPLE REGRESSION EQUATIONS FOR MATERNAL BEHAVIOR FACTORS ON STANDARDIZED MENTAL DEVELOPMENT INDEX

Variable	Multiple R	R <sup>2</sup>	Partial correlation	T
Full model	.48	.23		
Factor 1			.41	3.30**
Factor 2			-.25	-1.86
Factor 3			-.28	-2.11
Dummy 1			.27	2.02*
Dummy 2			-.08	-0.56*

\*  $p < .05$ . \*\*  $p < .01$ .

Correlations were computed to estimate the relationship between maternal behavioral style and the ratings of children's behavior. For the total sample, controlling for children's age, only 2 of 12 correlations were significant: Factor 1 was related to child enjoyment,  $r = .56, p < .01$  and Factor 2 was related to child expressiveness,  $r = .30, p < .01$ . The correlations for each of the three age groups indicated significant relationships between Factor 1 and child enjoyment,  $r = .60, p < .01$ , and Factor 2 and child activity,  $r = .45, p < .05$ , for 1-year-olds; and between Factor 1 and child enjoyment,  $r = -.60, p < .01$ , Factor 2 and child attention,  $r = -.50, p < .05$ , and Factor 3 and child attention,  $r = -.57, p < .01$ , for 2-year-olds. None of the correlations for 3-year-olds were significant.

Correlations were also computed to identify relationships of both Mental Development Index and maternal behavioral style with a set of 13 demographic variables related to children's health status, family socioeconomic status (SES), and involve-

ment in early intervention. When the effect of children's age was held constant, only months of intervention was related significantly to Mental Development Index for the total sample,  $r = .26, p < .05$ . Correlations for the three age groups, however, indicated significant relationships of Mental Development Index with days of hospitalization for 2-year-olds,  $r = -.63, p < .01$ , as well as with birthweight,  $r = .45, p < .05$ , gestational age,  $r = .48, p < .05$ , and months of intervention,  $r = .64, p < .01$ , for 3-year-olds. For the total sample, the maternal behavior factors correlated significantly only with months of intervention. Months of intervention was related with both Factor 1,  $r = .49, p < .01$ , and Factor 3,  $r = -.37, p < .01$ . The correlations for each of the age groups indicated the following significant findings: for 1-year-olds, Factor 3 was related with SES,  $r = .49, p < .05$ , and birthweight,  $r = .49, p < .05$ ; for 2-year-olds, Factor 1 was related to gestational age,  $r = -.71, p < .01$ , and months of intervention,  $r = .49, p < .05$ ; and for 3-year-olds, Factor 1 was related to gestational age,  $r = .51, p < .01$ , and months of intervention, whereas Factor 2 was related to birthweight,  $r = -.62, p < .01$ , days of hospitalization,  $r = .51, p < .01$ , and maternal age,  $r = .45, p < .05$ .

### Discussion

There were two major findings in this study. First, mothers' style of interacting with their retarded children appears to change as their children grow older. These developmental changes indicate that mothers of older children are more sensitive and responsive than are mothers of younger children and are more likely to engage in developmentally appropriate interaction. The correlations between the maternal behavior factors and the ratings of children's behavior indicates that some of these changes in mothers' behavior may be reciprocally related to developmental increases in children's behavior. Still, it is possible that these trends reflect a developmental adjustment of these mothers toward a more effective style of interacting with their retarded children.

A second finding was that there is a sig-

nificant relationship between maternal behavioral style and children's cognitive status. Two aspects of this result are particularly noteworthy. First, the ratings of maternal style accounted for approximately 25% of the variance in children's developmental status. The reliability of this finding is uncertain because it is based upon a small sample of mother-child interaction, yet the magnitude of this relationship is consistent with correlations that have been reported for nonretarded children (Clarke-Stewart, 1973). Second, the pattern of maternal style associated with children's cognitive functioning is similar to characteristics of maternal style associated with the development of nonretarded children. Many of the maternal behaviors that contributed to Factor 1, Child-Oriented/Maternal Pleasure, are also associated with positive development in nonretarded children. These include sensitivity to the child's state, enjoyment, responsiveness, and appropriate teaching. Likewise, many of the maternal characteristics that contributed to Factor 3, Control, also relate negatively to the development of nonretarded children. These include directiveness, control, and insensitivity to the child's interests. Factor 2, Quantity of Stimulation, reflected the relative dominance of the mothers while interacting with their children. The negative relationship of this factor with cognitive status suggests that mother-dominated patterns of interaction are associated with lower levels of child functioning.

These findings contrast considerably with the prevailing philosophy regarding intervention with retarded children. Most early intervention programs have emphasized teaching strategies that are highly didactic and/or carefully structured to obtain preplanned behavioral objectives (Bailey & Worley, 1984). In many instances early intervention programs instruct parents to develop didactic teaching skills that can be used during routine interactions with their children. In this sample, however, mothers whose children had the highest Bayley scores were neither highly controlling nor very directive. They allowed their children to lead the activity, and they par-

ticipated by responding enthusiastically and appropriately to their children's interests. In general, at each of the three age levels, these mothers seemed more concerned about supporting activities that their children initiated than they were about directing their children to engage in activities that they desired. They were willing to accept their children's behavior even though the quality was undoubtedly less than age-appropriate.

The pattern of correlations observed in this investigation underscores the inadequacy of the cross-sectional design of this study to identify causal determinants of behavior. Two factors emerged as having significant relationships with maternal behavioral style: ratings of children's enjoyment and the number of months that children had been in intervention. In addition, there was some evidence that children's health status (e.g., birthweight and days of hospitalization) was related to maternal style. Because these same variables are also related to children's developmental status, it is possible that differences in maternal style were determined by differences in children's developmental status rather than vice versa. This possibility appears to be particularly compelling in light of the apparent discrepancy between prevailing early intervention philosophy and the maternal style observed in this study. Rather than clarifying causal relationships between maternal style and children's development, the results from this study suggest several questions that are critical for intervention programs that are focused on parent-child interaction. For example, do early intervention programs that teach directive or didactic style to parents actually accomplish this goal? Might not an intervention strategy that is focused on decreasing maternal directives and increasing maternal responsiveness be more effective than parent-centered interventions that stress more didactic interactional patterns? Will children's enjoyment increase as parents become more child-oriented and responsive to their children? Answers to these questions clearly require longitudinal research designs to assess the interrelationship of maternal and child behavior from one time point to the next.

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