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ABSTRACT

The study investigated variation in infant behaviors and maternal responses among dyads with 18 handicapped and 18 normal infants. Mother-infant interaction sessions were videotaped and motor evaluations conducted. Data collected included behavioral ratings of infant affect and of infant looking patterns, ratings of maternal behavior in play with her child, and questionnaire responses regarding maternal depression. Results revealed that handicapped and nonhandicapped infants significantly differed from one another in the frequency and type of behaviors exhibited. Handicapped Ss demonstrated more negative affect and more looking away than did normal Ss in interaction with their mothers. The two groups of mothers were also significantly different in their interactive styles. Mothers of handicapped Ss received higher ratings in the amount of their interactive behavior but did not differ from mothers of normal Ss in the quality or appropriateness of behavior. The only infant characteristic associated with maternal interaction was neuromotor risk. However, when the influence of early intervention was considered, the type of intervention services received was significantly associated with mothers' interaction ratings. Finally, none of the infant characteristics measured was significantly associated with maternal depression scores. Sixteen pages of references are provided. Appendices include (1) measures (Parent Child Interaction Scale and others); and (2) conference presentations. (CL)

FINAL REPORT

VARIABILITY OF INFANT SOCIAL-COMMUNICATIVE BEHAVIOR IN CAREGIVER-INFANT INTERACTIONS

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CFDA: 84.023B

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March 1, 1985

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FOREWORD

This final technical report is written to satisfy the requirements of the grant under which the study was undertaken. At the end of the funding period, sufficient time had not expired to completely finish the data analyses. Additional services were provided by the training program supporting the student (the Research Training Program) and the Frank Porter Graham Child Development Center. Therefore, this report represents, in final form: a) the study which served as the basis for the dissertation and which was funded by the grant agency, and b) additional research presentations developed from this work.

FINAL TECHNICAL REPORT ON STUDY:

MOTHER-HANDICAPPED INFANT INTERACTIONS:

A COMPARISON OF CAREGIVER AND INFANT CHARACTERISTICS

Introduction

The most influential context in which an infant learns social, communicative, and cognitive skills is in social interaction with his caregiver. This relationship is gaining popularity as a potentially important setting for the habilitation of deviant infant or caregiver patterns. Most notably, early intervention specialists are beginning to recognize parents as a heterogeneous group that benefits from individualized and varied approaches to their involvement with their special children. Regrettably, little data exist on the way specific infant and caregiver characteristics influence this relationship when the infant is handicapped. The purpose of this study was to investigate variation in infant behaviors and maternal responses among dyads with handicapped and normal infants. By emphasizing salient infant characteristics and quality of maternal behaviors, this study was designed to contribute to our knowledge of similarities and differences in interactions across divergent groups of dyads. Information gained from this study should strengthen intervention strategies aimed at improving the quality of caregiver-infant interaction. These strategies may open successful avenues in the habilitation of the infant's social-communicative deficits.

The background for the present study is described in the

following sections. Specifically, the roles of maternal responses and handicapped infant signalling characteristics are examined in light of interactional theory regarding normal dyadic processes.

Interactional Theory

The abundant literature on infant-caregiver interaction springs from intense interest in how social patterns shape child development. This focus on interactive behavior and its relationship to learning is not a new phenomenon. Freudian theory, popularized in the 1950's, suggested that the environment played the predominant role in the determination of adult characteristics, and therefore stressed the importance of the caregiver-infant relationship in the socialization of the child (Caldwell, 1964). In 1958 Bowlby, drawing from ethological work, alerted researchers to the potential significance of the infant-caregiver relationship when he introduced his formulation of attachment theory. The early bond established between mother and child was seen as the essential ingredient in the child's later success with social relationships. While Bowlby saw the mother-child bond as reciprocally based, he viewed all infants as possessing the same repertoires of behaviors. Following Bowlby, Ainsworth (1973) proposed that the way in which the parent responded was crucial to the security of the child's attachment. She suggested that sensitive responsiveness to the child's cues was the one quality in mother-child interactions most likely to foster secure attachments. Consequently, these hypotheses contributed to the

prevailing notion that the caregiving role was the single most influential determinant in whether a child would cope successfully with his environment.

Much of the early research that followed in mother-child interaction weighed heavily on the mother's ability to pace and organize exchanges with her infant. However, in 1968 Bell questioned the validity of assigning total responsibility to the parent for establishing these early patterns. Instead, he proposed that interaction was bidirectional, and that the infant was a partner with equal power who could affect changes in the behavior of his caregiver. Evidence from experimental analyses in the 1970's supported the shift to viewing the infant as capable of participating in interactions with his caregiver; that he was competent with respect to his perceptual and cognitive capabilities (Lewis & Rosenblum, 1974; Rheingold & Hoskins, 1978; Stone, Smith & Murphy, 1973). Based on the results of these investigations, researchers began to view the infant as biologically "preadapted for social interchange" (Schaffer, 1977). The infant's behaviors were viewed as organizers of exchanges with his caregiver. Als (1979) has suggested that the organizational capacities of an infant include the ability to maintain physiological balance, to maintain postural control, to maintain states of alertness, and to interact reciprocally. Each of these components has been explored separately by various researchers.

The ability to maintain physiological balance is commonly referred to as regulation. Regulation describes the infant's

ability to coordinate both his own physiological routines and interactions with his primary caregiver (Brazelton, 1982; Tronick, 1982). The patterning of an infant's nonverbal behavior, such as the periodicity of non-nutritive sucking (Wolff, 1967), and the rhythmicity of body movements synchronized with adult speech (Condon & Sander, 1974) are two examples.

The ability to maintain postural control translates into the infant's capacity for volitional movement. Normally developing infants are equipped with many of these responses at birth. For instance, the ability to move against gravity develops as reflexes become integrated and the nervous system matures (Bobath, 1967; Prechtl, 1982).

The ability to maintain states of alertness refers to an infant's control over his state of consciousness (Brazelton, 1982). States range from deep sleep to alert and active agitation. The infant's control over the duration of these states increases with age, as does the variety of states in his repertoire (Wolff, 1966).

The infant can pace his responses and coordinate looking, smiling, vocalizing, and/or touching vis-a-vis the behavior of his caregiver. Together, the infant's abilities allow him to interact reciprocally.

Collectively, the infant's organizational capacities provide the basis for the infant's signalling abilities which have been shown to influence the way in which a mother interacts with her child (Brazelton, 1982; Field, 1978; Lewis & Rosenblum, 1974).

For example, the infant learns that his looks, smiles, vocalizations, and movements are attended to by others and produce certain effects. In time the infant uses these signalling behaviors purposefully with the anticipation that others will act in predictable ways. In order for the parent to respond predictably to infant behaviors, the infant must produce signals which can be easily read and interpreted. According to Goldberg (1977), an infant who is easily read; that is, gives predictable and reliable responses and who is responsive and attentive to interactive bids, enhances adult feelings of efficacy. With clear signals, it is also more likely that the adult will respond quickly and appropriately. Conversely, when infant behavior is difficult to read, the probability that decisions will be quick and appropriate is diminished.

Most researchers today recognize the infant as a powerful contributor to the interactive process. Yet, it is the caregiver's role in pacing and organizing the tempo of interactional behavior in relation to her infant's level of activity, mood, and state of arousal that continues to be underscored. Obviously, the caregiver commands greater sophistication in interactive skills when compared to a young infant who possesses a limited interactive repertoire. In addition, it is the caregiver who is more easily influenced to change certain behaviors. Researchers have yet to find an effective way to experimentally alter infant behaviors.

Maternal responsivity and sensitivity to infant signals

remains the focus of a great deal of research. In part, this focus is due to the theoretical implications of responsive maternal behavior for optimal infant development. Clarke-Stewart (1973) demonstrated that maternal responsivity to infant social signals was related to higher Bayley scores and other indices of infant development. Similar findings have been noted by other researchers in which various measures of maternal sensitivity and responsiveness were related to higher infant competencies (Bell, 1970; Donovan & Leavitt, 1978; Stevenson & Lamb, 1979). Another facet of maternal behavior presumably important to infant development is the mother's skill in arranging the environment and facilitating learning in her child. According to Bruner (1975), mothers engage in an implicit pedagogy which involves the mediation of environmental events appropriate for infant learning. Appropriate maternal teaching and facilitative techniques have been positively related to infant competence (White & Watts, 1973; White, 1975).

In summary, successful infant-caregiver interactions appear to evolve out of contributions by both partners Though not singularly responsible for the entire social interchange, it seems tnat the caregiver's behavioral framework offers the infant a vast circuitry into which he usually makes a successful connection. Infants have the capacity to regulate their own behavior and are by no means devoid of social responses. Therefore, the caregiver's task in interacting with her baby may not involve organizing his responses, but rather adapting her own

behavior into the structure of her infant's existing repertoire.

Mother-Handicapped Infant Interactions

In cases where infant behavior differs from normal development, the mother's ability to adapt her behavior to the child's behavioral idiosyncracies is more critical. With premature infants, early interactional imbalances often develop between mother and infant. When contrasted to fullterm infants, premature infants have been noted to gaze away more often, exhibit greater fussiness, and be less responsive to visual and auditory events (Field, 1978; Goldberg, Brachfeld, & DiVitto, 1980). Mothers of preterms reportedly become more intense and controlling in their interactions, creating more discord than harmony (Brown & Bakeman, 1980; Field, 1979; Goldberg, 1979). However, in many cases these early differences are not sustained over time. Mothers appear to compensate for the condition of their infants and are successful in establishing an interaction style which supports harmonious interactions (Brown & Bakeman, 1980). The infant is also capable of certain "self-righting" tendencies. Developmental differences have not been found when these infants have been compared to fullterm infants at later ages (Brown & Bakeman, 1980). While instances of such self-righting tendencies may be noted, there is less spontaneous recovery among biologically handicapped infants. In order for a caregiver and handicapped infant to overcome interactive differences, intervention may be necessary. Notable examples are included in the works by Decarie (1969) and Fraiberg (1974), in

which thalidomide babies, lacking fully developed limbs, and blind babies both achieved normal levels of cognitive development and adequate social interactions once intervention strategies were employed.

Recent research into the patterns of interaction between mothers and their handicapped children has indicated that both infants and mothers may exhibit unique interaction styles. The following sections separately describe the infant and caregiver roles when the infant is biologically handicapped.

The Mother's Role

For handicapped babies, the role of the caregiver in early social interactions may play a significant role in determining developmental outcome. Sameroff and Chandler's (1975) seminal paper on the interaction of risk factors predictive of later outcome aptly illustrates the importance of this relationship for the atypical child. In their transactional model, a prediction of developmental outcome based on static and unilateral risk factors is inappropriate. As in the case of the premature infant, a responsive and contingent environment may well make the difference between a child whose initial handicap is transformed into later deficits or one whose early problems are eliminated. Another illustration of the importance of the caretaking environment for handicapped infants is reflected in Kearsley's work (Kearsley, 1978). He discusses the phenomenon of "iatrogenic retardation" in which the biological status or initial handicap of the child may actually be compounded by the caregiver's

negative perception of his capabilities.

Based on the above, it appears that characteristics of both the child and the caregiver may affect the caregiver-child relationship. Although researchers recognize the importance of constitutional and environmental factors in the development of the atypical child, little empirical data exist on the ways in which caregivers interact with these infants. The emerging literature, which is based on direct observations of mothers and handicapped children, suggests that unique maternal interaction styles exist. Of particular interest is the observation that the caregiver of a handicapped child takes on more responsibility for the balance of the interaction. These interactive styles have been described as overactive (Walker & Kershman, 1981), controlling (Dunst, 1980; Eheart, 1982; Jones, 1980; Kogan, Wimberger, & Bobbitt, 1969), and directive (Breiner & Forehand, 1982; Cunningham, Reuler, Blackwell, & Deck, 1981; Kogan, et.al., 1969; Marshall, Hegerenes, & Goldstein, 1973; Stoneman, Brody, & Abbott, 1983). In general, these studies have found that caregivers of handicapped children exhibit a tendency toward a) increased amounts of directive and commanding statements, b) increased amounts of lead-taking in interactions, and c) increased amounts of control over the features of the interaction. These findings have been similar when normally-developing contrast infants have been matched according to the handicapped child's developmental age or chronological age.

Most investigations to date have been with handicapped

children two years of age and older. However, studies conducted with infants and toddlers have reported similar findings. In one of the earliest studies, Jones (1977) found that mothers of Down syndrome infants were more controlling in their interactions than mothers of normal infants when the infants were matched on a developmental variable. Dunst (1980) reported similar results, although he noted that maternal behavior changed with developmental advances in the child. Mothers tended to be less controlling with developmentally more advanced infants, although mothers of handicapped infants exerted more control overall than mothers of normal infants.

The implication of these findings is that the mother is less sensitive to the child's signals and therefore less responsive and appropriate in her interactions (Bromwich, 1981). This assumption has been unchallenged. However, there is a need to go beyond the mere quantity difference that has been found in previous studies. It is important to establish whether this interaction style is unique to mothers of handicapped children and whether it is adaptive or inhibitory of the child's optimal development.

In a study of mother-child interactions with handicapped children, Crawley and Spiker (1983) recently proposed that mothers of handicapped children who were directive in their interactions and sensitive provided the most optimal learning environment. Examining individual differences within a sample of two-year-old Down syndrome children and their mothers, these

authors found that mothers engaging in this interactive style actually had children who performed the best on a standardized measure of infant development. One explanation for these findings may be that infants exhibiting the most delayed behavior were also less able to produce clearly readable signals of interest or intent. These infants may have been more difficult for a parent to engage or maintain in interactions. In fact, the authors note that mothers who attempted to control or direct interactions with their low-functioning children were sometimes met with resistance or conflict on the part of the child. As a result, these mothers would be rated as high on directiveness but low on stimulation value and sensitivity. From this perspective one wonders whether this study actually represents a child effect on parent behavior. Unfortunately, as with most studies on dyadic patterns of interaction, true cause-effect relationships are impossible to determine (Belsky, Goode, & Most, 1980).

Based on the results of studies investigating the patterns of interaction between mothers and their developmentally delayed youngsters, it seems important to examine maternal interactive behavior in a more differentiated way. Given that mothers represent a wide range of interactive styles, it is important to not only look at the amount of maternal interactive behavior, but also the responsiveness, sensitivity, and appropriateness of their interactions with their particular children. It is also important to recognize differences in child abilities. A child exhibiting delayed behavior which is topographically the same as

the normal infant, just slower in appearance, is different from the child who exhibits atypical or "different" behaviors from that which one finds in normal populations. Maternal ability in responding appropriately and sensitively may be restricted in these cases.

The Infant's Role

Unlike the normally developing infant, a child having incurred neurological damage is at risk for a variety of distorted interactions. Since interaction most often involves facial and gestural components, any restriction in movement would be expected to affect the synchrony, regulation, timing, and intensity of the child's initiations toward and responses to others (Brazelton, Koslowski & Main, 1974). The earliest infant behaviors to be recognized as interactive in nature have included looks, smiles, and cries. Each of these lines of research will be presented, as well as the influence of postural tone and movemen. patterns on the child's signalling capabilities.

Looking patterns. Mutual regard is one of the earliest reciprocal behaviors to develop between mother and infant. Infant looking toward mother has been described as a potent elicitor of maternal responsiveness (Robson & Moss, 1970). It serves the dual purpose of orienting the infant to the mother and as a signal to mother to elicit an interactional experience. In describing this dual function, Stern and colleagues (Jaffe, Stern, & Perry, 1973; Stern, Beebe, Jaffe, & Bennett, 1977) point

out that when either mother or infant looks at the other, the probability of the partner engaging in en face gazing is increased. During these periods of mutual gazing, other interactional behaviors including smiles, vocalizations, and gestures increase. When one member of the dyad looks away these interactional behaviors decrease. However, when objects are present, mothers and infants tend to look more often at the same object than at one another. In this situation, the object actually becomes the topic of interest. The coordination of mutual looking to objects between mother and infant contributes to the infant's development of referential language. In summary, mutual looking between mother and infant is a potent and functional communicative signal that sets the stage for more complex interactions.

The potency of this signal is revealed when one witnesses the effect that a deficit in visual behavior has on the caregiver. Nowhere is this more vividly illustrated than in Fraiberg's (1968, 1974, 1975, 1977) work with blind infants and their mothers. Her research demonstrated that the inability of the infant to establish eye-contact with his caregiver inhibited the caregiver's ability to read the child's intentions. In many cases, this failure to make visual contact resulted in the caregiver avoiding social contacts with the infant altogether. It has also been suggested that the distortion in interaction patterns resulting from visual deficits in the child contributes to a sense of inadequacy and feelings of depression in the

caregiver (Emde & Brown, 1978; Fraiberg, 1974).

Visual deficits less severe than blindness may also profoundly influence caregiver behavior. Brain-damaged infants often demonstrate either a delay in the development of visual behaviors or a deviation in their display of looking behaviors. For example, both Dunst (1979) and Jones (1977) noted a marked deficiency in the referential looking (glancing back-and-forth between mother and the focus of play) of Down syndrome infants compared to developmentally-matched normal infants in interactions with their caregivers. Down syndrome infants were less likely to center the topic of interaction on an external object, thereby failing to contribute to their development of more complex language.

When examining whether handicapped infants are as capable of eliciting their mother's attention as normally-developing infants, researchers have found conflicting results. Emde, Katz, and Thorpe (1978) reported that Down syndrome infants manifested poor eye-to-eye contact with their caregivers during interactions. However, other researchers have not found differences in mother-infant eye-contact for normal and atypical infants when matched on developmental level. This lack of differences has been noted for Down syndrome infants (Gunn, Berry, & Andrews, 1982; Jones, 1977), retarded infants (Buckhalt, Rutherford, & Goldberg, 1978), and multiply-handicapped infants (Kysela & Marfo, 1984). For example, Kysela and Marfo (1984) examined the mother-child interaction patterns of a heterogenous

group of multiply-handicapped infants. They did not find group differences between infant looking at mother. However, other patterns of infant looking behavior were not examined. Infants may have differed in the amount of time they spent looking at toys or gazing away from both mother and toys. The authors did find group differences between mothers looking at their infants. Mothers of handicapped infants looked significantly more often at their infants than mothers of normal infants. It may be that greater amounts of maternal looking at the infant elicited greater attention of the infant to the mother.

While looking at mother may not differentiate groups of dissimilar infants, atypical infants have been reported to engage in more frequent gaze aversions than normal infants in interaction with the caregiver. Field (1979) noted that high-risk infants characteristically engaged in more gaze aversion during interactions with their mothers than non-risk infants. As a result, mothers were more likely to be intrusive and controlling in their attempts to engage their children.

In summary, infant looking patterns may differentially affect the responsiveness of their caregivers. Visual behavior, when delayed, absent, or deviant, is expected to influence the infant's signalling abilities and, in turn, affect caregiver behavior. Looking away behavior may be the most difficult looking pattern for a mother to read and interpret and may well be the best differentiating characteristic between infants

developing normally and those developing atypically.

Affect. Several investigations have confirmed that handicapped infants demonstrate delays and differences in their expression of affective behaviors (Emde, et.al., 1978; Cicchetti & Stroufe, 1978; Gallagher, 1979). Many of these reports are based on experimental situations rather than naturalistic mother-child interactions. These experimental situations have been useful in focusing attention on possible deviations in affective signalling capabilities of atypical children. In a study of Down syndrome infants, Cicchetti and Stroufe (1978) found signs of delayed positive affect. They examined the developmental appearance of affective responses to an array of stimuli ordered according to cognitive complexity. Although the Down syndrome infants exhibited a delay in the expression of smiles and laughs, they responded in the same sequential order as the normal infants. In addition to these observed delays, Down syndrome infants were also noted to exhibit a reduced range of affective expression (Cicchetti & Stroufe, 1978), and reduced intensity (Cytryn, 1975).

While group differences were apparent between handicapped and normal infants, Cicchetti and Stroufe (1978) also noted individual differences among the Down syndrome infants They reported infant variation in terms of cognitive functioning, degree of hypotonia, level and range of affective expression. Infants with the lowest cognitive scores were found to exhibit the most severe hypotonia, the greatest delay in response to

affective stimuli, and an absence of laughter. This relationship of postural tone to the infant's expression of affect was the focus of a study by Gallagher (1979). He observed the expressions of multiply-handicapped youngsters to caregiver-presented stimuli based on the items developed by Cicchetti and Stroufe. The results of this investigation indicated a relationship between the degree of muscle tone impairment (whether hypotonia or hypertonia) and the ability of the child to laugh. Specifically, the more abnormal the child's muscle tone the less able the child was to produce laughter.

The literature on infant affective expressions during interactions with their caregivers is sparse. So far, results of studies indicate that handicapped infants demonstrate a lower incidence of positive affect compared to normal infants of equivalent developmental or chronological age (Brooks-Gunn & Lewis, 1982; Buckhalt, et.al, 1978). Evidence also points to an increased incidence of negative affect in the interactive behavior of handicapped infants (Brooks-Gunn & Lewis, 1982). These infants may cry more often and be more difficult to calm once crying has begun. Furthermore, the evidence of less intense expression of affect in handicapped infants when exposed to experimental conditions hypothetically contributes to less readability of infant affective signals by the mother.

The current literature base from which we must draw conclusions about infant affective expressions during social interactions is limited. While the affective expressions of

infants, both negative and positive, are potentially effective signals for eliciting maternal responsiveness it is unclear how much influence they have on the quality of the mother-child relationship.

Neuromotor status. Infant behaviors which are often interpreted as communicative signals in social interactions include smiles, looks, vocalizations, and gestures. These infant behaviors are dependent upon increasing flexibility and control over motor responses.

A child suffering central nervous system damage often exhibits a delay in the acquisition of motor responses, as well as qualitative differences in the manifestation of postural tone and movement patterns. When aberrant, postural tone influences the child's activity level (Bobath, 1967; Robinson, 1982), ability to signal with gestures (Walker, 1982), and expression of positive affect (Gallagher, Jens, & O'Donnell, 1983). The severity of abnormal postural tone has been implicated in reducing the intensity and clarity of infant signals (Cicchetti & Stroufe, 1978; Gallagher, et.al, 1983), and in reducing the child's ability to initiate or respond to others within an expectable period of time (Connors, Williamson, & Siepp, 1978).

Many of these infants will require special handling and positioning in order to participate in interactions with others. Kogan and her colleagues have studied the interaction styles of physically handicapped children, aged 2-7 years, and their mothers. They found that the physically handicapped children

exhibited lower involvement levels in interaction with their mothers than the non-handicapped children. In contrast, their mothers exhibited greater assertive control than mothers of normal children. More work is needed to determine if a) this dyadic pattern of increased maternal effort is elicited in order to facilitate and maintain an interaction with an unresponsive child, and b) this interactive style is related to the child's abnormal and delayed movement patterns.

Maternal Symptoms of Depression

The literature on families of handicapped children describes a broad array of difficulties encountered by their family members. Though there have been positive and adaptive outcomes reported, investigations have repeatedly reported that families experience increased stress as the result of rearing a handicapped child (Crnic, Friedrich, & Greenberg, 1983; Farber, 1960). Stress may be manifested in many different ways, including parental depression, marital difficulties, increased physical illnesses, and psychosomatic symptoms. On an individual level, problems range from mild shock to serious depression. The type and severity of the response is related to characteristics of the child (Beckman-Bell, 1980), and characteristics of the individual and related variables (Crnic, et.al., 1983). Beckman (1982) found that infant characteristics were significantly related to the amount of stress reported by the mother. Specifically, maternal reported stress was related to the child's unusual or additional caregiving demands, responsiveness, repetitive

behavior patterns, and temperament. Single mothers also reported higher levels of stress than mothers with fathers present in the home. Several investigators report that parental depression is a common manifestation of the stress related to raising an atypical child (McMichael, 1971; Natterson, 1973). Olshansky (1962) labels this depression "chronic sorrow", and suggests that parents of handicapped children experience long-term sorrow that varies over time and between individuals, but is always present.

Few studies have examined how stress or its manifestations may affect the caregiver-child relationship directly or indirectly. Child characteristics have been shown to have a profound effect on the number of reported symptoms of stress or depression in parents. This effect on the parent is likely to have a circular and negative influence on the parent-child relationship. There is a need for future research studies which examine the influence of stress and child characteristics on the developing parent-child relationship.

Summary, Research Questions, and Hypotheses

In summary, three domains of infant behavior were described which potentially affect the way in which a mother interacts with her infant and which may contribute to maternal symptoms of depression. The goals of this study were to describe the similarities and differences of maternal behavior and infant characteristics in same-aged handicapped and normal infants, and to examine the association of these characteristics with maternal styles of interaction and maternal symptoms of depression. Based

on the review of the literature, the following four research questions were posed and hypotheses generated:

RQ1. What are the similarities and differences in the affective, visual, and physical characteristics presented by handicapped and normal infants in social interactions with their mothers?

Hypothesis 1: It was hypothesized that normal and handicapped infants would differ in three domains of infant behavior - affect, visual, and neuromotor - when observed in interaction with their mothers. Specifically, handicapped infants were expected to demonstrate less positive and more negative affect, exhibit more looking away, and score higher overall neuromotor risk scores than their normal agemates.

RQ2. Are mothers of normal and handicapped infants different in their interactive behaviors or reported symptoms of depression?

Hypothesis 2: It was hypothesized that mothers of handicapped and normal infants would differ in their interactive behaviors. Specifically, mothers of handicapped infants were expected to demonstrate a greater amount of interactive behavior but be less likely to respond appropriately to their child's developmental capabilities.

Hypothesis 3: Based on previous research which found that mothers of handicapped children experience more symptoms of depression as a result of raising a handicapped child, it was hypothesized that the two groups of mothers would differ in the

degree of depressive symptomatology they reported. Specifically, mothers of handicapped infants were expected to report more symptoms of depression than mothers of normal infants.

RQ3. Are any of the infant characteristics associated with the maternal ratings of the amount, quality, and appropriateness of their interactive behaviors?

Hypothesis 4: It was hypothesized that maternal ratings on the amount, quality, and appropriateness of interaction would be inversely related to infant measures of negative affect, looking away, and high neuromotor risk scores, and directly related to infant positive affect.

RQ4. Are any of the infant characteristics associated with maternal symptoms of depression?

Hypothesis 5: It was hypothesized that high levels of depressive symptomatology would be directly related to infant measures of negative affect, looking away, and high neuromotor risk, and inversely related to positive affect.

Methods

In order to test the hypotheses proposed in this study, mothers of normally-developing and biologically-handicapped infants were seen in a variety of contexts. Information was gathered from mothers in the absence of their children, infants were assessed separately with mothers present, and mothers and infants were observed while playing together. The methods used for gathering information, assessing and observing behavior are described in the following sections.

Setting

All mother-infant interaction sessions were videotaped in a laboratory playroom at the Frank Porter Graham Child Development Center. All but two motor evaluations were conducted in this same laboratory. The two exceptions were completed at the child's local intervention site.

All mother-infant sessions were videotaped through a clear Plexiglass barrier that was secured across one section of the room. The camera was positioned in a closet and hidden from view behind a black curtain. The camera was manned for all sessions and the camera-person was carefully hidden from view behind the curtain. Directly across from the camera, on the opposing side of the Plexiglass barrier, a gym mat and two large pillows were placed for the mother and infant to sit or lie on. Also in this

8 x 9 foot area were 1) a changing table equipped with disposable diapers and wipes, 2) a small parson's table which held magazines and tissues, 3) a square stool, and 4) several standard toys placed around the room. These toys included a box of plastic blocks, a toy truck, a caterpillar pull toy, a play telephone, clown stacking rings, and a small plastic tub containing a music box, rattle, small wooden people, cloth scarf, doll and baby bottle, soft animal rattle, teapot, cups/saucers, and plastic squeak toy. A diagram of the laboratory set up for the mother-infant session is depicted in Figure 1.

Insert Figure 1 about here

The motor evaluations were conducted in this same area although the only equipment present was the changing table, mat, a square stool, and specific toys used in the evaluation. These sessions were also videotaped.

Subjects

Thirty-six infants and their mothers served as subjects for this study. Participants included 18 normally developing infants and 18 with a variety of handicapping conditions. All subjects were participants in the Carolina Institute for Research in Early Education for the Handicapped II (CIREEH II). CIREEH II is a research institute funded by the Department of Education, Special Education Programs grant.

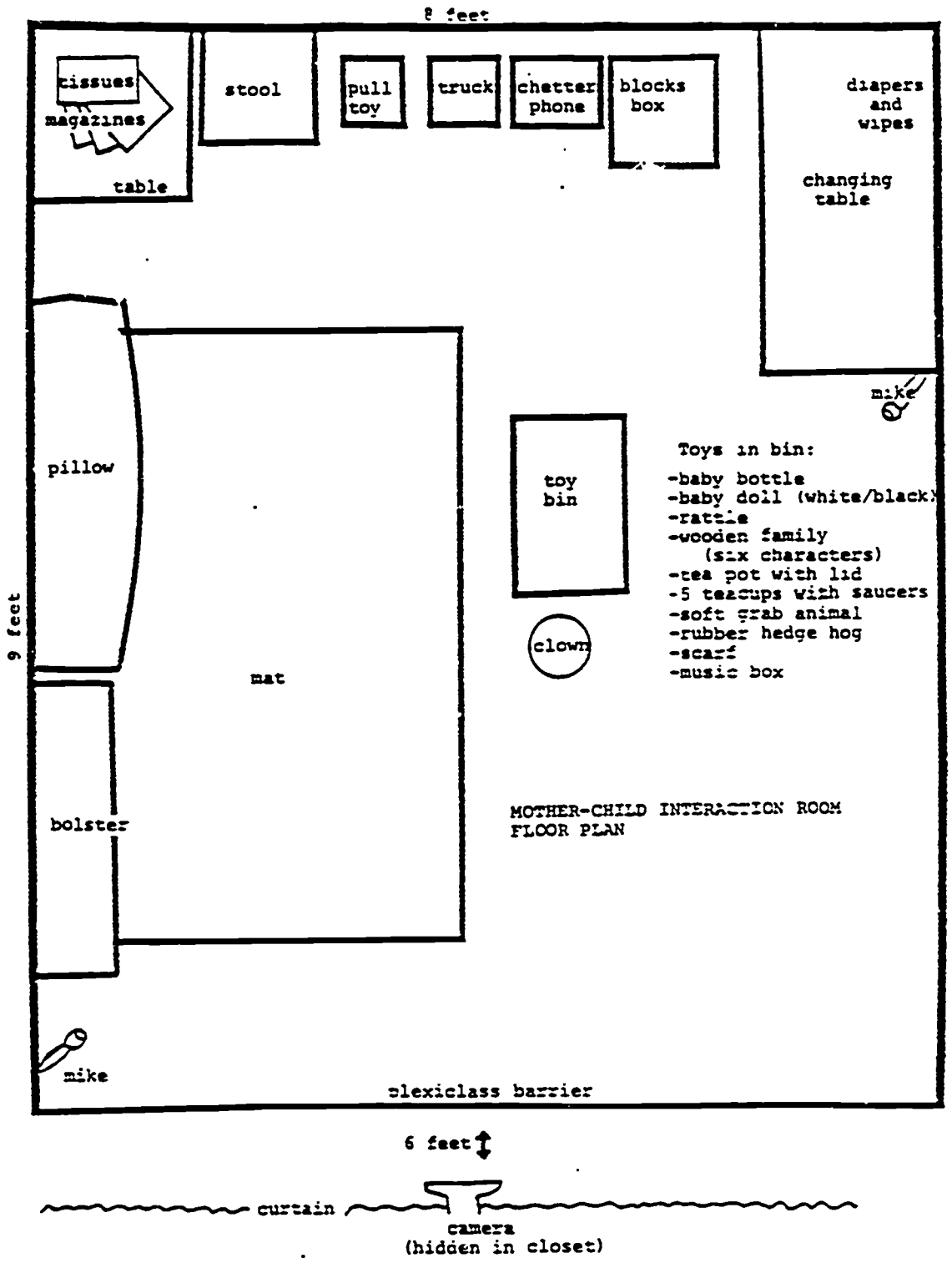

Figure 1. Diagram of Laboratory Arrangement for Mother-Infant Interaction Session

Infant Characteristics

Handicapped infants were selected from referrals to the Parent and Child Together (PACT) teams operating in the State of North Carolina and funded by the Department of Human Resources. This program provides home-based early intervention to handicapped infants and their families in the Chapel Hill and surrounding area. In addition, referrals were solicited from three local hospitals, pediatricians, physical therapists in private practice and professionals at the Division for Disorders of Development and Learning (DDDL), a University Affiliated Facility. All infants selected were currently involved in some type of intervention program. However, this intervention varied along two dimensions: length of time involved in intervention and the intensity of this involvement. Length of involvement ranged from two months to ten months before they were evaluated for this study, and intensity of services ranged from those delivered three times a week to those provided once a month.

Information from county birth records was used to recruit non-handicapped infants. Caregivers were contacted and asked if they would like to participate in a study investigating the learning capabilities of infants. Interested caregivers were scheduled for an appointment at this time.

Both samples of infants were evaluated and videotaped within an age range of 2 months. Selecting a "window" of development (10-12 months CA) was particularly useful in recruiting handicapped infants since (1) this range allows for more elgible infants

within a limited geographic area, (2) most infants with Down syndrome or other apparent problems have been identified by then, (3) these infants were likely to be out of a hospital or guarded condition by this age, and (4) the infant was likely to have developed a strong attachment to his primary caregiver which is characterized by an intense prelinguistic period prior to the development of words (Schaffer, 1977).

Demographic characteristics of the infants are summarized in Table 1. Both samples of infants were approximately 11 months

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Insert Table 1 about here

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of age. Nearly equal numbers of males and females and first- and later-born infants were represented in each group. With the exception of two handicapped infants, all were Caucasian. One selection criteria of the non-handicapped babies was that they exhibit cognitive abilities within normal limits. The Bayley Scales of Infant Development were administered to all infants, normal and handicapped. All of the non-handicapped infants exhibited cognitive abilities appropriate for their chronological age. The atypical babies, on the other hand, ranged in cognitive abilities from profoundly delayed to age-appropriate levels. Due to the severity of their delays, specific Mental Development Index (MDI) scores on the Bayley could not be derived for five handicapped infants. Estimated scores of 27 were therefore assigned (Naglieri, 1981). Furthermore, the handicapped infants

Table 1

Demographic Characteristics of Handicapped and Normal Infants

Variable	Group	
	Normal (n=18)	Handicapped (n=18)
Infant age in months		
M	11.06	11.11
Range	9.77 - 12.13	10.9 - 12.12
Birth order		
First-born	9	10
Later-born	9	8
Gender		
Male	10	11
Female	8	7
Race		
Caucasian	18	16
Black	0	2
Bayley MDI		
M	112.50	64.11
SD	26.97	28.80
Range	104 - 134	27 - 106

manifested a variety of disorders and did not fall neatly into one primary etiologic category. The infants' diagnoses included Down syndrome (5), cerebral palsy (4), dysmorphic syndromes (2), undiagnosed developmental delay (2), post-meningitis (2), spina bifida (1), degenerative diseases (1), and severe birth trauma (1). None of the infants was blind as the result of structural abnormalities.

Family Characteristics

Family information on both handicapped and normal infants is presented in Table 2. Family social status scores were

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Insert Table 2 about here

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computed using Hollingshead's Four Factor Index (1978). These scores and information about family income indicate that the families observed in this study were largely well-educated and middle-class. All but one mother were married with fathers present in the home. Nearly half of the mothers of handicapped infants were employed outside the home at least part-time, and more than half of the mothers of normal infants worked outside the home.

Procedures

This study includes data from several sources: behavioral ratings of infant affect, behavioral ratings of infant looking patterns, ratings of maternal behavior in play with her child, evaluation of the infant's movement patterns, and information

Table 2

Family Characteristics of Handicapped and Normal Infants

Variable	Group: Handicapped (n=18)	Group: Normal (n=18)
Maternal age		
M	29.90	32.72
SD	6.05	3.47
Family social class		
M	43.75	50.94
SD	12.41	1.87
Annual family income		
M	6.89[a]	8.28[b]
SD	2.56	1.87
Maternal employment status		
Fulltime in home	10	6
Part-time outside home	4	8
Full-time outside home	4	4

Note. Family social class was computed by Hollingshead's 4-Factor Index which considers the education and occupation of both parents.

[a] This score represents an income range of $20,000-25,000.

[b] This score represents an income range of $25,000-30,000.

from a questionnaire on maternal symptoms of depression. To obtain these data three separate procedures were necessary. One procedure involved the videotaping of the mother and infant playing together in the laboratory playroom. A second procedure consisted of the evaluation of the infant's movement patterns, and the third procedure involved the collection of maternal depression symptomatology from a self-report questionnaire. Since infants have limited attention spans, two sessions, separated by approximately one week, were necessary in order to complete all three procedures.

The first session consisted of three parts: (1) an evaluation of infant cognitive abilities with the Bayley Scales of Infant Development, (2) an evaluation of infant movement patterns with the Movement Assessment of Infants (MAI), (3) and information gathered from maternal questionnaires, including maternal depression and family demographic information. Mothers were present for both of the infant evaluations and filled out questionnaires following the evaluations. The Bayley was conducted first, with the child sitting on the mother's lap across the table from the examiner. In five cases, the handicapped child was unable to sit on the mother's lap for participation in the Bayley evaluation. Instead, the infant was evaluated while lying on a gym mat. When the Bayley was completed the mother and child joined a different examiner for the evaluation of the child's movement patterns. This evaluation, the Movement Assessment of Infants (MAI), was conducted on a mat placed on the

laboratory floor. Different toys were used for the MAI, and the procedure was videotaped. Mothers were encouraged to ask questions any time during the MAI evaluation. At the completion of both the Bayley and MAI, an interpretation of the evaluation results was presented to the mother.

The second session involved the videotaping of the mother-child semi-structured play session. Both normal and handicapped infants were accompanied by their caregivers to the laboratory playroom at the Frank Porter Graham Child Development Center (FPG). Mothers were asked to play with their children as they normally would at home given twenty minutes of free time. Although it was acknowledged that the laboratory playroom and toys were probably very different from their home, it was emphasized that we were interested in how mothers and infants typically played together. An examiner remained in the area talking to the mother until the mother "warmed up" and seemed relaxed in the setting. Mothers were also informed that we would continue videotaping for twenty minutes, but that we were just outside the room if they needed us. None of the mothers elicited any help from the experimenters during the taping of the play session. Following the taping session, mothers and infants were involved in other procedures conducted by investigators associated with CIREEH II.

The following section is organized first according to how reliability was estimated in general for this study. The sections that follow describe the measures used in this study and

the interobserver reliability estimates obtained.

Estimation of Reliability

Reliability between raters was estimated for each of the measures used. In this study, Generalizability theory (Cronbach, Rajaratnam, & Gleser, 1963) was used as a basis to estimate inter-rater reliability. Generalizability analysis extends the concept of "reliability" to recognize that raters' observations are made in situational contexts with numerous sources of variance in addition to interrater variability. It is based on the analysis of variance (ANOVA) model rather than on the view of reliability taken by classical test theory. Classical test theory is concerned with estimating some 'true score' rating of the phenomenon under observation. It falls short of this objective, however, because various sources of measurement error are ignored when calculating traditional reliability coefficients. An advantage of generalizability theory is that it allows for the design of reliability studies to examine each potential source of error that may affect ratings.

In the present study, a program in Statistical Analysis Systems (SAS) was used to estimate the variance components, which were the independent sources of variation (raters, individual subjects, and their interactions) contributing to the obtained observational ratings. The ideal is to show maximal explained variance due to subjects, with minimal variance attributable to raters. Generalizability coefficients were calculated from the estimated components of variance using a formula described by

Cronbach, Gleser, Nanda, & Rajaratnam (1972). These generalizability coefficients are intraclass correlation coefficients representing the ratio of the variance of the estimated universe (true) rating to the variance of the observed ratings. More specifically, the G-coefficient in the present case reflects the dependability of generalizing from a sample of trained raters to a hypothetical universe of trained raters.

Movement Assessment

Infant neuromotor development was assessed using the Movement Assessment of Infants (MAI) (Chandler, Andrews, & Swanson, 1980). The MAI was chosen as an appropriate measure for this study for several reasons. First, the MAI measures dimensions of motor functioning for infants up to 12 months of age that are not typically measured by traditional tests of motor skills (e.g., the Bayley Psychomotor Development Index or the Peabody Developmental Motor Scales). For instance, the MAI qualitatively assesses muscle tone which, when aberrant, has been implicated in altering an infant's activity level (Robinson, 1982) and diminishing the clarity of an infant's facial expression (Emde, et.al., 1978). Second, the MAI is sensitive enough to detect subtle differences within a sample of normal infants and likewise detects variability within a sample of handicapped infants (Lydic, Short, & Nelson, 1983). Third, although the MAI is a newly developed test and is unstandardized, reliability studies have recently been undertaken.

In an initial study of interobserver reliability and

test-retest reliability, Harris, Haley, Tada & Swanson (1984) report fair to good reliability estimates. In their study, two examiners tested 53 infants, 26 preterm and 27 fullterm 4-month-olds. Reliability coefficients estimated for the combined group were .72 for the total risk score, .57 for muscle tone, .51 for primitive reflexes, .78 for automatic reactions, and .65 for volitional movement. Test-retest reliability coefficients ranged from .16 to .87; the coefficient for the total risk score was .76 for the combined sample.

Fourth, significant predictive validity for infants with known or suspected risk status (when tested with the MAI at 4 months) was found when these same infants were tested with traditional cognitive and motor assessments at one and two years of age (Harris & Swanson, 1984). In summary, the MAI was considered to be a sensitive, reliable instrument appropriate to evaluate both normal and handicapped infant development.

The MAI consists of four subscales, each describing different qualitiative measures. These subscales are muscle tone, automatic reactions, primitive reflexes and volitional movement. The section on muscle tone includes items that assess anti-gravity postures, extensibility of extremities and consistency of muscle tissue. The primitive reflexes section assesses the presence or absence of reflexes that normally occur in early infancy. The section on automatic reactions consists of items which assess the righting and equilibrium reactions, and the volitional movement section includes a wide range of items such

as hearing, visual tracking, and motor milestones (e.g., head control, rolling, sitting).

The MAI allows the evaluator to systematically evaluate the quality of an infant's movement patterns through the use of objective scoring criteria for each of the 65 items. Each item is scored on a continuum from 1-4 or 1-6 and each point along the continuum is behaviorally anchored. A composite score, reflecting the degree of risk for pathological movement patterns is derived for each subscale. These derived scores are comprised of risk points assigned to those behaviors the child demonstrates but should not at his age, or those behaviors absent from his repertoire but which should be present. These four composite subscale scores were summed for a total cumulative risk score. The higher the score, the greater the risk.

For 10 (28%) infants, the assessment was conducted by an examiner who, along with another observer, independently scored all subscales. These reliability sessions were interspersed among the 36 infant evaluations. For the remaining 26 infants, the examiner administered and scored the assessment alone. Reliability was estimated by performing a generalizability analysis using a random effects, analysis of variance design. The estimated variance components and the generalizability coefficients for the individual scales are provided in Table 3. An inspection of Table 3 suggests that raters and the interactions

Insert Table 3 about here

involving raters made only minor contributions to the total variance. Individual subjects, on the other hand, made major contributions to the total variance. The G-coefficients were all very high, exceeding the acceptable level of .80 generally recommended (Bartko, 1976).

Infant Affect

Infant affect behaviors were scored from the videotaped mother-child interaction session. The infant behaviors scored were negative affect and positive affect. Negative affective behaviors included fretting, crying and whining, while positive affective behaviors included smiling and laughing.

Data were collected with an electronic data collection device, the OS-3, designed by Observational Systems Inc. of Seattle. This recorder allows one to collect frequency and duration data, and also calculates summary statistics. Two observers independently scored 10 (28%) mother-infant sessions interspersed over the course of the study for the purpose of reliability. One observer scored the remaining 26 tapes. Reliability was estimated by performing a generalizability analysis. The estimated variance components and the generalizability coefficients for positive and negative affect are provided in Table 4. An inspection of Table 4 indicates that the

Table 3

Estimated Variance Components and Generalizability Coefficients for Movement Assessment Scales

Scale	Estimated variance components			Generalizability coefficient with 2 raters
	Individual subjects	Raters	Subjects x raters	
Muscle tone	26.89	1.10	1.80	.97
Primitive reflexes	19.44	.08	3.27	.92
Automatic reactions	102.44	.77	3.58	.98
Volitional movement	237.87	.00	3.13	.99
Total score	638.00	.00	22.31	.98

Note. Negative variance components were reported as 0.

Insert Table 4 about here

major contribution to the total variance was made by individual subjects. Raters and the interactions involving raters made only minor contributions to the total variance.

Infant Looking Patterns

Duration data in three mutually exclusive categories of looking behavior were collected. These categories included: infant looking at mother; infant looking at toys; infant looking away from both toys and mother (includes scanning of the environment).

The OS-3 was used to collect duration and frequency data. Duration data were used to determine the proportion of the session the child engaged in each category of looking behavior.

Reliability checks were conducted by two observers over the course of the study. For 10 infants (28%) these observers independently scored the infant's looking patterns through a one-way window as the session was being filmed. For the remaining 26 infants (72%) only one observer scored the sessions. G-coefficients were used to estimate reliabilities for the three looking categories. The estimated variance components and generalizability coefficients for the looking categories are provided in Table 5. As indicated in Table 5, the major contri-

Table 4

Estimated Variance Components and Generalizability Coefficients for Positive and Negative Affect

	Estimated variance components			
Scale	Individual subjects	Raters	Subjects x raters	Generalizability coefficient with 2 raters
Positive affect	66.81	.00	4.80	.97
Negative affect	190.91	.51	9.34	.98

Note. Negative variance components were reported as 0.

Insert Table 5 about here

bution to the total variance was made by individual subjects with only minor contributions made by raters and their interactions.

Caregiver Interactions

Ratings of maternal behaviors during mother-child interaction sessions were made with the Parent-Child Interaction Scale (PCIS) (Farran, Kasari, & Jay, 1983). Based on a review of the relevant literature pertaining to mother-child interaction with handicapped dyads this scale was considered appropriate to the questions involved in this study. The PCIS measures 11 maternal behaviors. These include physical involvement, verbal involvement, responsiveness, play behavior, teaching, structuring of the child's overall activity, structuring of the child's specific behaviors, sequencing, positive emotion, negative emotion, and goal setting. According to this scale, mothers were assigned an average rating in the amount, the quality, and the appropriateness of these behaviors.

The scale is currently being used with several populations of young children and their caregivers and reliability data are being collected. The PCIS has demonstrated fair reliability estimates in an initial study of mother-child interaction with 6-month-old infants at risk for developmental retardation (Kasari, Farran, & Yoder, 1984). In this study two raters independently rated 16 videotaped sessions of mother-infant

Table 5

Estimated Variance Components and Generalizability Coefficients for Categories of Looking Behavior

Looking categories	Estimated variance components: Individual subjects	Raters	Subjects x raters	Generalizability coefficient with 2 raters
At toys	39059.49	.00	1181.38	.99
Away	15059.94	.00	1509.47	.95
At mother	8335.60	.00	191.36	.99

Note. Negative variance components were reported as 0.

interaction. Generalizability coefficients used to estimate reliability were reported to be .92 for Amount, .53 for Quality, and .59 for Appropriateness.

The validity of the scale has been demonstrated in two separate studies (Huntington & Simeonsson, 1984; Kasari, Farran & Yoder, 1984). Maternal characteristics, such as education and age, and child characteristics, such as gender and birth-order were not correlated with the PCIS scores. However, factors expected to affect the mother's style of interaction, such as the child's developmental age and temperament, were correlated with the scores obtained on the PCIS.

This global rating scale was recently and specifically adapted for use with populations of developmentally delayed children and their caregivers. Therefore, the first step in training raters involved detailed discussion of the scales. Excerpts from several practice tapes of children of different developmental levels were viewed so that raters might get an idea of the range of behavior to be expected among mothers and their young children. Subsequently, raters jointly observed numerous practice tapes, rating maternal behaviors aloud, and discussing any disagreements. During this time, the scales and conventions were refined and clarified. When the observers found that their level of agreement was satisfactory, they proceeded independently to rate sixteen non-training tapes from a separate sample of at-risk infants and their mothers. Item by item intra-class coefficients were calculated and those that were below .50 were

re-discussed and clarified. Overall, training reliability was estimated at .77 for the total scale. Training reliability coefficients obtained were all above .50 for the three scales, Amount, Quality, and Appropriateness of maternal behavior.

Two observers then independently rated a random sample of 10 (28% of the total sample) videotaped mother-infant interaction sessions used in this study. G-coefficients estimating inter-rater reliability ranged from .82 to .93. Since the summary scores for the three scales of the PCIS (Amount, Quality, and Appropriateness) were the scores of ultimate interest for future analyses, these are the scores for which reliability estimates are reported. These coefficients and their variance components are provided in Table 6. All generalizability coefficients

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Insert Table 6 about here

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exceed the "usually admitted" level of .80 recommended by and Bartko (1966) and Cardenet, Tourneur, & Allal (1976).

Caregiver Depression

A maternal self-report measure of depressive symptomatology was used, the CES-D (Radloff, 1977). The scale consists of 20 symptoms, any of which may be experienced occassionally by healthy individuals. A seriously depressed person would be expected to experience many of these symptoms. A score greater than 36 on this scale is indicative of an individual at great risk for depression.

Table 6

Estimated Variance Components and Generalizability Coefficients for Parent-Child Interaction Scales

Scale	Estimated variance components			Generalizability coefficient with 2 raters
	Individual subjects	Raters	Subjects x raters	
Amount	17.96	.00	4.45	.89
Quality	43.38	.47	6.58	.93
Appropriateness	41.69	.83	18.12	.82
Total scale	265.56	1.08	81.67	.87

Note. Negative variance components were reported as 0.

The CES-D items were selected from previously validated depression scales and reflect components of depressed mood, feelings of guilt and worthlessness, feelings of helplessness, psychomotor retardation, loss of appetite and sleep disturbance. The items are scaled on a 1-4 Likert-type scale ranging from "none of the time" to "most of the time". Four items are worded positively in order to discourage any tendencies toward response set.

The CES-D was used in an epidemological study of depression in the general population (Radloff, 1977). A measure of internal consistency (coefficient alpha) was high in the general population (.85), and even higher in a psychiatric patient population (.90). Test-retest correlations would not be expected to be high since the scale was explicitly designed to measure current (the past week) level of symptomatology. This level is expected to vary over time. Test-retest correlations ranged from .51 to .67 with intervals between tests ranging from 2-8 weeks.

Validity of the scale was measured in terms of correlations with other measures of depression. These correlations were reportedly high with a number of different depression scales (Radloff, 1977).

In this study, coefficient alpha was used as an internal consistency reliability test for estimating the lower bound of test reliability based upon a single administration. Coefficient alpha was estimated at .59. This estimate is much lower than the coefficient reported by Radloff (1977). In this study the low

estimate may be due to the small and homogeneous sample of subjects.

Summary

The procedures involved in the collection of data for this study include behavioral observations from both live and videotaped records, direct evaluation of infant behavior, and information gathered from maternal self-report questionnaires. The data collected allowed four major levels of analyses:

1. Description of the behaviors exhibited by same-aged handicapped and normal infants in interaction with their mothers.
2. Description of maternal characteristics, those behaviors exhibited by mothers in interactions with their infants, and depression symptomatology scores based on a maternal self-report questionnaire.
3. Examination of differences between normal and handicapped infant behaviors. Examination of differences between mothers of normal and handicapped infants.
4. Examination of the association between infant behaviors and maternal behaviors.

Results

The presentation of results is organized according to the hypotheses posed at the onset of this study.

Infant Characteristics

Hypothesis 1: It was hypothesized that normal and handicapped infants would differ in three domains of infant behavior when observed in interaction with their mothers. Based on a review of pertinent literature, it was expected that handicapped and normal infants would differ in their looking patterns, affective expressions, and neuromotor status. Specifically, handicapped infants were hypothesized to demonstrate less positive and more negative affect, exhibit more looking away, and score higher overall neuromotor risk scores than their normal agemates.

Based on a review of the literature, four behavioral characteristics were expected to differ between handicapped and normal children when these children were observed in play with their mothers. These four characteristics are positive affect, negative affect, looking away, and total neuromotor risk scores. Descriptive statistics are presented in turn on each of these domains of infant behaivor. Hypothesis 1 was tested using multivariate analysis of variance (MANOVA) on the four infant characteristics expected to differ between the groups.

Descriptive Statistics

Affect. In Table 7 the means and standard deviations of the

Insert Table 7 about here

frequency of positive and negative affect are presented by group. The frequency of positive affect was very similar for both groups, although the variability and range of responses within groups was much greater for the handicapped sample. Compared to normal infants, handicapped infants exhibited more negative affect in interaction with their mothers. Handicapped infants expressed negative affect on the average of about ten times compared to about two times for the normal infants. Within groups of children, the individual variability was much greater for the handicapped infants. Even more illustrative is the fact that 50% of the handicapped infants cried or fussed more than 3 times during the free play session while only 17% of the normal infants cried or fussed 3 or more times. Sixty-one percent of the normal infants never cried while only 17% of the handicapped infants never cried.

Looking patterns. In Table 8 means and standard deviations

Insert Table 8 about here

are presented for the duration of the session that infants spent looking at toys, at their mothers, and away. Similarly, both groups of infants spent the majority of the session looking at toys and the least amount of time looking at their mothers.

Table 7

Mean Frequency of Positive and Negative Affect of Handicapped and Normal Infants in Interaction with their Mothers

Variable	Group	
	Handicapped (n=18)	Normal (n=18)
Positive affect		
M	8.44	7.28
SD	11.17	7.54
Range	0 - 39	1 - 26
Negative affect		
M	9.72	1.67
SD	13.89	3.51
Range	0 - 48	0 - 12

Table 8

Mean Duration in Seconds of Infant Looking at Toys, Away, and at Mother of Handicapped and Normal Infants in Interaction with their Mothers

Variable	Group	
	Handicapped (n=18)	Normal (n=18)
Infant looking at toys		
M	602.37	822.62
SD	317.51	132.77
Range	15 - 1026	116 - 1157
Infant looking away		
M	487.26	319.62
SD	279.95	118.23
Range	116 - 1157	109 - 525
Infant looking at mother		
M	101.88	48.22
SD	107.30	38.76
Range	8 - 384	13 - 145

Note. Duration of seconds calculated out of a possible 1200.

Handicapped infants spent approximately 50% of the session looking at toys while normal infants spent nearly 69% of the session looking at toys. Infants at 11 months of age, whether handicapped or not, spent very little time looking at their mothers, 9% of the session for the handicapped infants and 4% of the session for the normal infants. One difference between the groups was in the amount of time spent looking away from either toys or their mothers. The handicapped infants spent approximately 41% of the session looking away compared to 27% for the normal sample. In all three categories of looking behavior the within-group variability was two to three times as great for the handicapped sample as for the normal. In fact, one handicapped infant spent nearly the entire 20 minute interaction session looking away (1157 seconds).

Neuromotor status. The average number of risk points assigned to each subscale of the Movement Assessment of Infants (MAI) is presented by infant group in Table 9. The handicapped

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Insert Table 9 about here

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infants scored, on the average, a greater number of risk points on each of the four subscales and the scale as a whole when compared to normal infants of the same chronological age. Handicapped infants received a mean cumulative risk score four times greater than the average score received by normally

Table 9

Mean Risk Points Scored on the Movement Assessment of Infants by Handicapped and Normal Infants

	Group	
Subscales	Handicapped (n=18)	Normal (n=18)
Muscle tone		
M	7.44	1.00
SD	2.85	2.22
Range	0 - 10	0 - 8
Primitive reflexes		
M	4.11	.55
SD	2.87	.86
Range	0 - 9	0 - 3
Automatic reactions		
M	8.61	1.17
SD	4.63	2.48
Range	0 - 14	0 - 3
Volitional movement		
M	12.78	5.56
SD	7.02	1.34
Range	5 - 24	5 - 10
Total risk score		
M	32.94	7.72
SD	15.99	4.90
Range	6 - 56	5 - 21

Note. The higher the score, the greater the risk.

developing infants.

The clinical importance of the MAI is underscored in its utility in assessing the infant's attainment of motor milestones and in judging the quality of these patterns of movement. Data are presented on the individual subscales of the MAI in order to provide the reader with a reference of where the risk points were accumulating for the two groups of infants, not for the comparison of individual subscales. For example, muscle tone was a subscale where many of the handicapped infants received risk points but few of the normal infants did. Of a possible ten risk points, the handicapped infants received an average of seven points compared to approximately one point for the normal infants. In fact, only one handicapped infant received a normal muscle tone summary score. In contrast, 15 of the normal infants exhibited muscle tone within normal limits. The three normal infants who demonstrated muscle tone that was considered atypical were evaluated more than once on the MAI (to correct for possible chance performance) and a copy of the evaluation was sent to their pediatricians. None of the three was considered at high risk for a diagnosis of cerebral palsy. In all three cases normal movement patterns were developing and it was felt that tone would normalize with developmental growth.

Multivariate Analysis of Variance

A one-way multivariate analysis of variance (MANOVA) was used to test for differences between the groups on the infant characteristics, looking away, positive affect, negative affect,

and neuromotor risk. The Pillai-Bartlett Trace criterion was used to test the significance of the MANOVA. This criterion was selected since it is the most robust of the invariant tests when there is heterogeneity of covariance matrices (Olson, 1976).

Results indicated that there was a multivariate effect attributable to group. Univariate analyses were inspected to determine specific group differences. In Table 10 the results from the multivariate and univariate analyses of variance are

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Insert Table 10 about here

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presented. The univariate analyses indicated that the groups differed in their frequency of negative affect, overall neuromotor risk, and the duration of the session they spent looking away. Handicapped infants were more at risk in terms of neuromotor status, exhibited more negative affect, and demonstrated more looking away behavior. The groups did not differ in the frequency of positive affect they exhibited in interaction with their mothers.

Summary

The first research question was concerned with similarities and differences in infant characteristics. Based on the review of the literature, it was hypothesized that handicapped and normal infants would significantly differ in three domains of infant behavior, looking, affect and neuromotor. Overall, this hypothesis was upheld by the results reported in this study. A

Table 10

Multivariate Analysis of Group Difference on Infant Characteristics

Multivariate F (4,31) = 10.22, $p<.0001$

Variable	df	Univariate F	p
Neuromotor risk	(1,34)	40.94	.0001
Negative affect	(1,34)	5.69	.02
Positive affect	(1,34)	.13	NS
Looking away	(1,34)	5.48	.03

significant group difference was found in the predicted direction. Handicapped infants presented greater neuromotor risk, exhibited more looking away, and expressed more negative affect. However, one hypothesized difference was not found. It was expected that handicapped infants would exhibit less positive affect than normal infants in interaction with their mothers. The results of this study found no differences between the groups on the frequency of positive affect.

Maternal Characteristics

> Hypothesis 2: It was hypothesized that mothers of handicapped and normal infants would differ in their interactive behaviors with their children. Specifically, mothers of handicapped infants would demonstrate a greater amount of involvement and would be less likely to respond appropriately to their infants' developmental capabilities.

The second hypothesis was concerned with similarities and differences in maternal interactive behavior with handicapped and normal infants. Descriptive statistics are presented for the three areas of maternal interactive behavior measured by the Parent-Child Interaction Scale (PCIS). Each area - - amount, quality, and appropriateness - - of maternal interactive behavior is presented separately. Hypothesis 2 was tested with a multivariate analysis of variance (MANOVA) procedure on the three areas of maternal behavior expected to differ between the groups.

Descriptive Statistics

Amount of maternal interaction. The PCIS was used to rate the amount of maternal behavior in interaction with her infant. Means and standard deviations are presented in Table 11. Mothers

Insert Table 11 about here

of handicapped infants consistently exhibited more of each of the eleven maternal behaviors assessed than mothers of normal infants. However, the pattern was very similar between the two groups of mothers. That is, similarly high or low ratings were received by both groups of mothers on the same item, and the range of variability within groups was likewise similar.

Quality of maternal interaction. In Table 12 the average

Insert Table 12 about here

group ratings are presented on the quality of maternal behaviors assessed with the PCIS. Nearly all of the average ratings of maternal behavior were high (an average rating above 3.50 on a 5-point scale). Ratings were very similar for both groups of mothers in terms of average ratings and within-group variability. On the total score for the quality of maternal interaction mothers of normal infants scored a slightly higher average rating than mothers of handicapped infants.

Appropriateness of maternal interaction. In Table 13 means

Insert Table 13 about here

and standard deviations for the average ratings on the approp-

Table 11

Average Maternal Ratings on the Amount Subscale of the Parent-Child Interaction Scale

	Group			
	Normal		Handicapped	
PCIS items	M	SD	M	SD
Physical contact	2.22	(.73)	3.50	(1.10)
Verbal interaction	3.17	(1.10)	3.44	(1.10)
Responsiveness	3.61	(.92)	3.78	(1.20)
Play	3.89	(1.18)	4.28	(1.02)
Teaching	1.94	(.94)	2.33	(.91)
Structuring of child's activity	3.11	(.96)	3.78	(.94)
Directiveness of specific behaviors	2.44	(.92)	3.06	(1.11)
Sequencing	2.94	(1.11)	3.00	(1.03)
Positive emotion	3.50	(1.04)	3.67	(1.03)
Negative emotion	1.39	(.50)	1.39	(.50)
Goal setting	3.00	(.97)	3.67	(.97)
Total score	2.84	(.63)	3.26	(.56)

Note. The higher the number the higher the rating.

Table 12

Average Maternal Ratings on the Quality Subscale of the Parent-Child Interaction Scale

	Group			
	Normal		Handicapped	
PCIS items	M	SD	M	SD
Physical contact	4.47	(.72)	3.78	(.94)
Verbal interaction	4.17	(.99)	4.06	(1.06)
Responsiveness	4.33	(.77)	4.17	(.79)
Play	3.56	(.98)	3.67	(.91)
Teaching	4.15	(.99)	3.47	(1.12)
Structuring of child's activity	3.72	(1.41)	4.28	(.96)
Directiveness of specific behaviors	4.61	(.50)	4.33	(2.08)
Sequencing	2.83	(1.15)	3.06	(1.11)
Positive emotion	4.78	(.43)	4.39	(.98)
Negative emotion	4.43	(.53)	4.71	(.49)
Goal setting	3.67	(1.08)	3.67	(.91)
Total score	4.03	(.60)	3.92	(.65)

Note. The higher the number the higher the rating.

Table 13

Average Maternal Ratings on the Appropriateness Subscale of the Parent-Child Interaction Scale

	Group			
	Normal		Handicapped	
PCIS items	M	SD	M	SD
Physical contact	4.29	(.85)	4.00	(.84)
Verbal interaction	3.78	(1.31)	3.83	(1.34)
Responsiveness	4.00	(.97)	3.50	(1.04)
Play	4.56	(.98)	4.11	(1.18)
Teaching	4.69	(.63)	4.00	(1.12)
Structuring of child's activity	3.61	(.85)	3.89	(1.08)
Directiveness of specific behaviors	4.17	(.71)	4.11	(.96)
Sequencing	2.89	(.90)	3.17	(.92)
Positive emotion	4.78	(.55)	4.72	(.67)
Negative emotion	4.29	(.95)	3.57	(1.40)
Goal setting	4.00	(.91)	3.72	(1.07)
Total score	4.05	(.59)	3.90	(.80)

Note. The higher the number the higher the rating.

riateness of maternal behavior are presented. The majority of ratings received by both groups of mothers was high (an average rating above 3.50 on a 5 point scale). Average ratings and standard deviations were quite similar between groups of mothers. Mothers of normal infants scored a slightly higher average rating on the total appropriateness scale than mothers of handicapped infants.

Multivariate Analysis of Variance

Figure 2 illustrates differences between the normal and

Insert Figure 2 about here

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handicapped groups on maternal ratings of interactive behavior. The 11 individual items were summed and averaged for each of the three scales of the PCIS, amount, quality, and appropriateness. Mothers of handicapped infants obtained a higher average rating on the amount of interactions (3.26) than mothers of normal infants (2.84). However, on the quality and appropriateness of interactions, mothers of normal infants received higher average ratings (4.03 and 4.05) than mothers of handicapped infants (3.92 and 3.90).

A one-way multivariate analysis of variance (MANOVA) procedure was used to test for group differences on the summary ratings of amount, quality, and appropriateness of maternal behavior. The Pillai-Bartlett Trace criterion was used to test the significance of the MANOVA.

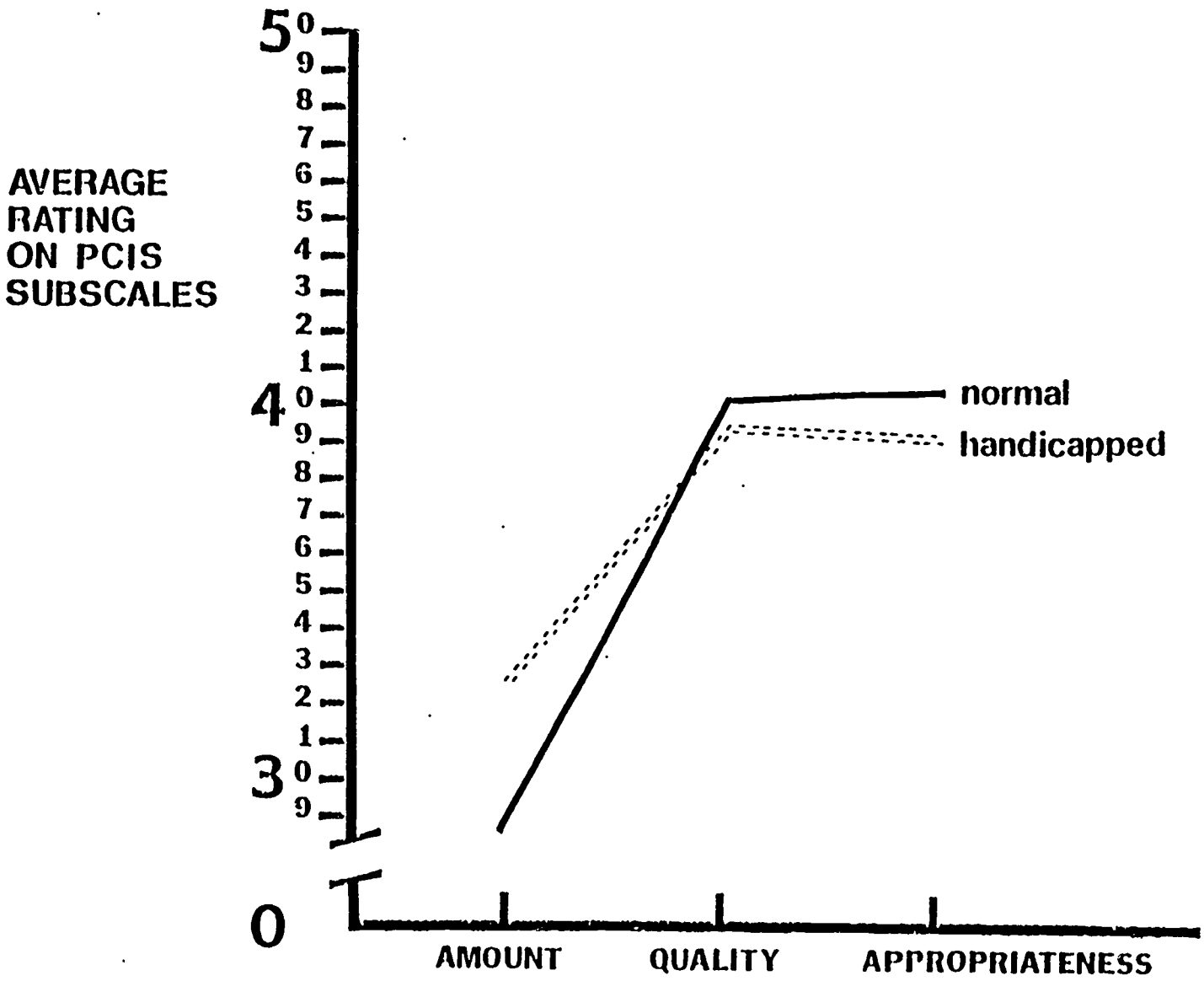

Figure 2. Summary Ratings of Maternal Behavior with Handicapped and Normal Eleven-Month-Old Infants

Results indicated that there was a multivariate effect attributable to group. Univariate analyses were inspected to determine specific group differences. Table 14 shows the

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Insert Table 14 about here

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results from the multivariate and univariate analysis of variance. The univariate analyses indicated that the two groups of mothers differed significantly in the amount of their interactive behavior. Mothers of handicapped infants exhibited more of the behaviors under observation than mothers of normal infants. There were no differences between the groups in terms of the quality and appropriateness of interactive behavior. Thus, the hypothesis of overall differences between the two groups of mothers was upheld although group differences in quality and appropriateness of maternal behavior were not found.

> Hypothesis 3: Based on previous research which found differences in the degree of depression reported by mothers of normal and handicapped children, it was hypothesized that mothers of handicapped infants would report significantly more symptoms of depression.

The third hypothesis was tested with an independent group t-test procedure. In Table 15 the data are presented on the

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Insert Table 15 about here

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descriptive statistics and the results of the test for group differences. The average number of symptoms reported and the

Table 14

Multivariate Analysis of Group Difference on Maternal Interactive Behaviors

Multivariate F (3,32) = 3.13, $p<.039$

Variable	df	Univariate F	p
Amount	(1,34)	4.52	.04
Quality	(1,34)	.26	NS
Appropriateness	(1,34)	.45	NS

Table 15

T-Test Procedure and Average Symptoms of Depression Reported by Mothers of Handicapped and Normal Infants

Group	n	M	SD	t	p
Handicapped	18	32.22	9.45		
				1.34	NS
Normal	18	28.39	7.61		

variability of scores were very similar for the two groups of mothers. According to the measure used (the CES-D, Radloff, 1977), if a score of 36 symptoms or greater is obtained, the individual is considered "at risk" for clinical depression. In this study, four (22%) mothers of normal infants and six (33%) mothers of handicapped infants were considered to be "at risk" for serious depression. While there was a trend toward increased symptoms of depression among the mothers of handicapped infants, a significant difference between the two groups of mothers was not found. Therefore, the hypothesis of group difference in reported maternal symptoms of depression was not supported.

Summary

The hypothesis that mothers of handicapped and normal infants would differ in their interactive styles was supported by the results reported in this study. An overall multivariate effect attributable to group membership was found. Mothers of handicapped infants differed from mothers of normal infants in the amount of their interactive behavior. However, expected differences in the quality and appropriateness of maternal behavior were not found.

The literature suggested that mothers of handicapped children experience greater symptoms of depression than mothers of normally developing children. The hypothesis of a group difference in reported depressive symptomatology in this sample of mothers of eleven-month-old infants was not supported.

Association Between Infant Characteristics and Maternal Interactive Behaviors

Hypothesis 4: It was hypothesized that maternal ratings on the amount, quality, and appropriateness of interaction would be inversely related to infant measures of negative affect, looking away, and high neuromotor risk scores, and directly related to infant positive affect.

In order to test Hypothesis 4, it was necessary to first determine whether the analysis should proceed with the total group or each group separately. Therefore, the inter-relationships of the infant variables within groups were examined for the purpose of determining whether the two samples of infants could be pooled into a single sample. The likelihood ratio test within the discriminant function procedure was used to test for the homogeneity of within-group covariance matrices. Hypothesis 4 was subsequently tested through correlation procedures.

Likelihood Ratio Test

This procedure was used as a test for the homogeneity of within-group covariance matrices. Specifically, this procedure was used to determine whether the covariance matrices of the infant variables (looking away, negative affect, positive affect, and neuromotor risk) were significantly different as a function of group membership (handicapped versus normal). If these covariance matrices were not found to differ significantly as a function of group membership then the two groups could be pooled into a single sample of infants. Results of this procedure indicated that the within-group covariance matrices were significantly different (χ^2 =41.88, df=10, $p<.0001$). Therefore,

groups were not pooled into one sample.

Within-group inter-correlation coefficients are presented in Table 16. In the handicapped sample neuromotor risk was pos-

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Insert Table 16 about here

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itively related to negative affect. Looking away was positively related to both negative affect and neuromotor risk, and negatively related to positive affect. In other words, the higher the child's neuromotor risk the more the child engaged in negative affect and looked away during interactions with his mother. In the normal sample significant relationships were not found among any of the infant variables.

Correlations Between Infant Characteristics and Maternal Interactive Behaviors

In Table 17 the results of the Pearson Product Moment

Insert Table 17 about here

Correlations are presented indicating the relationship among measures of maternal interactive behavior and measures of infant characteristics. An examination of the data in Table 17 reveals that only the total neuromotor risk score for the handicapped infant group was significantly related to the amount of maternal interaction. The relationship between amount of maternal interaction and the infant neuromotor risk score approached

Table 16

Intercorrelations Between Infant Characteristics in the Handicapped and Normal Infant Samples

Characteristic	1	2	3	4
	Handicapped infants (n=18)			
1. Neuromotor risk	-	.60	.02	.51
2. Negative affect		-	-.40	.93
3. Positive affect			-	-.50
4. Looking away				-
	Normal infants (n=18)			
1. Neuromotor risk	-	.25	.31	.17
2. Negative affect		-	-.21	.34
3. Positive affect			-	-.03
4. Looking away				-

Table 17

Correlations Between Infant Characteristics and Maternal Interactive Behaviors

Infant characteristics	Maternal interactive behaviors: Amount	Quality	Appropriateness
	Handicapped infants (n=18)		
Neuromotor risk	.50*	.15	.18
Negative affect	.41	-.02	.10
Positive affect	.05	.28	.16
Looking away	.25	.01	.13
	Normal infants (n=18)		
Neuromotor risk	.44	.20	.33
Negative affect	.39	.05	-.01
Positive affect	.42	.26	.37
Looking away	-.14	-.22	-.15

* $p<.05$

significance ($p < .07$) in the normal sample.

No significant relationships were found between any of the other infant characteristics measured and maternal interactive behaviors for either group.

Summary

It was hypothesized that infant characteristics would be significantly associated with maternal interactive behaviors. The results reported in this study do not strongly support this association. Only neuromotor risk was significantly associated with the amount of maternal behavior in the handicapped sample.

Association of Infant Characteristics and Maternal Depressive Symptomatology

Hypothesis 5: It was hypothesized that high levels of depressive symptomatology would be directly related to infant measures of negative affect, looking away, and high neuromotor risk and inversely related to positive affect.

Having determined that the two groups of infants could not be pooled (see analyses reported for Hypothesis 4), separate analyses were conducted for each group in Hypothesis 5 as well. This hypothesis was tested with correlation procedures. Table 18 contains the correlations between infant characteristics and

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Insert Table 18 about here

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maternal depressive symptomatology by group. None of the infant characteristics was significantly related to maternal symptoms of depression in either sample. Therefore, no further analyses were

Table 18

Correlations between Infant Characteristics and Maternal Depression Symptoms in Normal and Handicapped Samples

Infant characteristics	Symptoms of depression	
	Mothers of handicapped infants (n=18)	Mothers of normal infants (n=18)
Neuromotor risk	.02	.17
Negative affect	.02	-.19
Positive affect	-.14	.23
Looking away	.13	-.02

conducted.

Summary

The hypothesis of an association between infant characteristics and maternal depressive symptomatology was not supported by the results obtained in this study.

Post-Hoc Analysis

Relatively few differences were observed in the interactive styles of mothers of same-aged, but behaviorally dissimilar, groups of infants. One further issue was considered based on these results. All of the handicapped infants and their mothers were receiving some type of early intervention services. It was believed that this participation may have indirectly influenced maternal behavior thereby inflating maternal ratings. Therefore, a post-hoc analysis was conducted concerning the ratings of maternal behavior by level and type of early intervention services.

Early Intervention and Maternal Interactions

All of the handicapped infants were involved in some type of early intervention program although their involvement varied along two dimensions: length of involvement in intervention, and the intensity of services received. One group of children (n=9) had been receiving intervention in the home on a regular weekly basis for greater than five months before they were evaluated for this study. The other group (n=9) had been receiving periodic evaluations, for example, once a month at a hospital clinic, or had just begun regular home visits, fewer than four months before

their evaluation for this study. In order to distinguish between the two groups, the former group was labeled the systematic intervention group and the latter group the periodic intervention group.

A t-test procedure (with a Bonferroni correction for the alpha level) yielded non-significant results for differences in infant age, maternal age, and family background as a function of intervention group. A multivariate analysis of variance procedure was conducted for comparison of periodic and systematic intervention groups in terms of PCIS ratings of the amount, quality, and appropriateness of maternal interaction. The Pillai-Bartlett Trace criterion was used to test the significance of the MANOVA.

Results of the MANOVA yielded an overall multivariate effect attributable to group. Univariate analyses were inspected to determine specific group differences. In Table 19 the results

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Insert Table 19 about here

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from the multivariate and univariate analysis of variance are presented. The univariate analyses indicated that mothers of infants receiving the systematic level of intervention services received significantly higher ratings in the amount, the quality, and the appropriateness of maternal interactive behavior. These differences are illustrated in Figure 3. Mothers of infants

Table 19

Multivariate Analysis of Systematic and Periodic Early Intervention Group Difference on Interactive Behavior of Mothers of Handicapped Infants

Multivariate F (3,14) = 8.60, $p<.002$

Maternal Variable	df	Univariate F	p
Amount	(1,16)	10.57	.005
Quality	(1,16)	14.41	.002
Appropriateness	(1,16)	20.35	.0004

than did normal infants in interaction with their mothers. Both groups of infants were similar in their expression of positive affect and their predominance in looking at toys over looking at their mothers. A separate evaluation of the infants' neuromotor status determined that the handicapped infants demonstrated higher risk scores than their normal agemates. The hypothesis that handicapped and normal infants would significantly differ in three domains of infant behavior, visual, affective, and neuromotor, was supported by the results reported in this study.

A second question concerned the differences or similarities in maternal characteristics between mothers of handicapped and normal infants. Maternal interactive behaviors were assessed according to the amount, quality, and appropriateness of eleven specific behaviors. Results indicated that the two groups of mothers were significantly different in their interactive styles. Mothers of handicapped infants received higher ratings in the amount of their interactive behavior but did not differ from mothers of normal infants in the quality or appropriateness of their behavior. The hypothesis of group differences in maternal interactive behavior was supported, although expected differences in the quality and appropriateness of interactions were not found. It was also hypothesized that mothers of handicapped infants would report more symptoms of depression than mothers of normal infants. This hypothesis was not supported by the results of this study. Mothers of the dissimilar groups of infants did not report significantly different levels of

Insert Figure 3 about here

receiving the systematic level of services obtained an average rating of 3.61 for amount, 4.36 for quality, and 4.48 for appropriateness compared to ratings of 2.92 for amount, 3.49 for quality, and 3.31 for appropriateness obtained by mothers of infants receiving periodic services.

In summary, the level and type of early intervention services received by mothers and their handicapped infants differentially influenced maternal ratings of interactive behavior with their children. Specifically, early intervention services, when delivered systematically, were associated with more positive ratings of amount, quality, and appropriateness of maternal interactive behaviors.

Summary of Major Findings

Data on infant and caregiver characteristics were reduced and analyzed, descriptively as well as quantitatively. Results are summarized within the context of the four major research questions and hypotheses.

How were the characteristics presented by handicapped and normal infant agemates in interaction with their mothers similar or different? Results indicated that the two groups of infants significantly differed from one another in the frequency and type of behaviors exhibited. Specifically, handicapped infants demonstrated more negative affect and more looking away

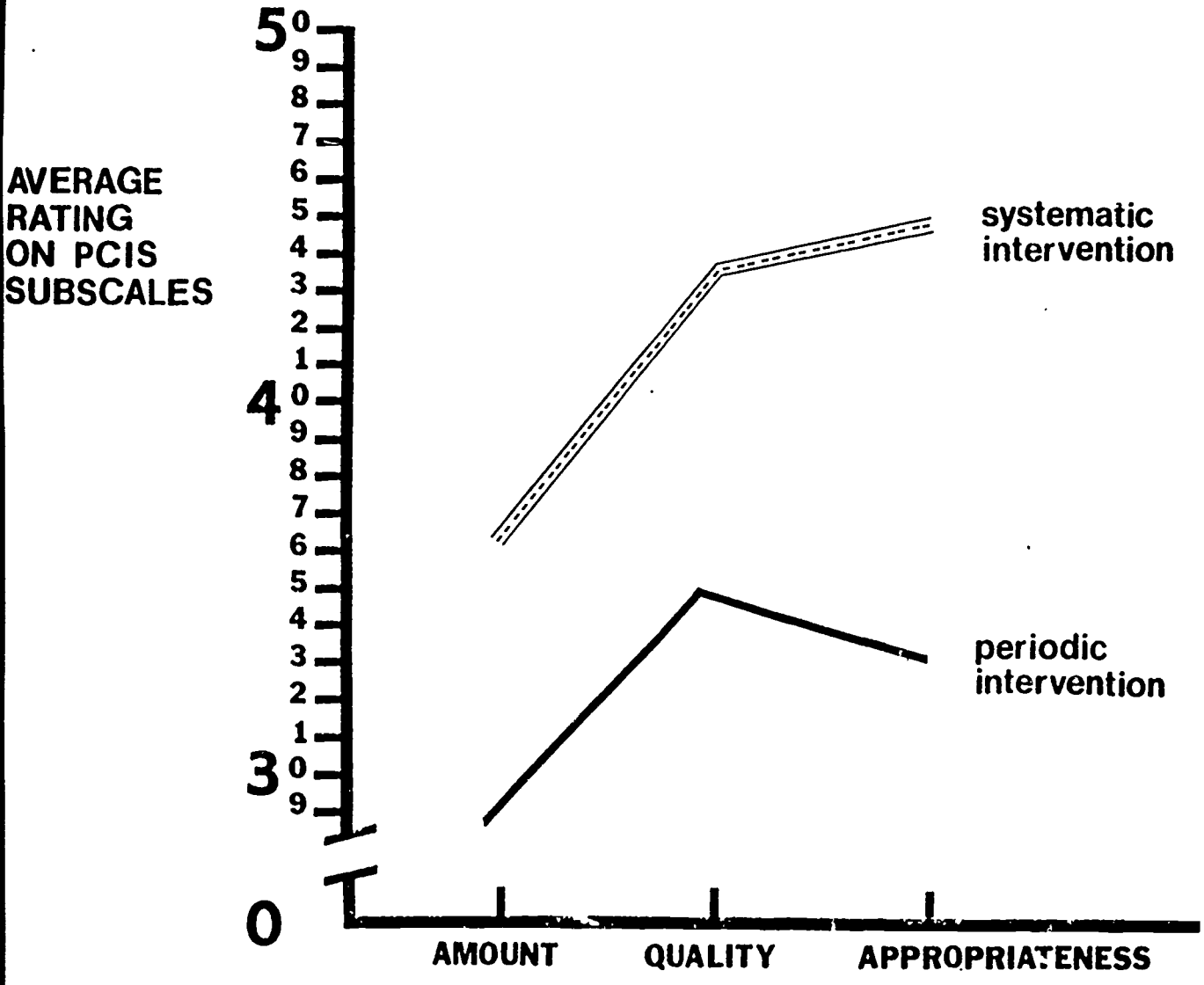

Figure 3. Summary Ratings of Maternal Behavior with Handicapped Infants Receiving Periodic or Systematic Early Intervention Services

depressive symptomatology.

Are specific characteristics of the infants associated with maternal interactive behavior? The infant characteristic, neuromotor risk, was associated with the amount of maternal interaction in the handicapped sample. None of the other infant characteristics was significantly associated with either the amount, the quality, or the appropriateness of maternal behavior with handicapped or normal infants. However, when the influence of early intervention was considered, the type of intervention services the handicapped infants received was significantly associated with the interaction ratings mothers received. The hypothesis of significant relationships between infant characteristics and maternal interactive behavior was not strongly supported by results reported in this study.

A final question concerned the association of infant characteristics and self-reported maternal depression. None of the infant characteristics was significantly associated with maternal depression scores. Therefore, the hypothesis that a significant relationship would be found was not supported by the results reported in this study.

Discussion

An increasing emphasis in research and interventions with handicapped children has been placed on the caregiver-child relationship. This emphasis stems in part from two assumptions. One concerns the belief that raising a handicapped child places the caregiver at risk for parenting difficulties, and the second concerns the importance placed on the quality of this early relationship as predictive of later child functioning. In spite of these assumptions, few studies have examined the mother-child relationship with handicapped infants under one year. These studies are needed if we are to broaden our understanding of the mother-handicapped child relationship and improve our targeting of intervention.

The goals of this study were threefold: to describe characteristics of handicapped and normal infants, to describe similarities and differences in maternal characteristics, and to examine relationships between infant and maternal behaviors. Specifically, it was expected that there would be group differences in mother-child interaction patterns and that these differences would be related to infant characteristics.

The five major findings from this study were: (1) handicapped infants exhibited characteristics different from normal infants in fairly predictable ways, (2) mothers of handicapped

infants were more interactive with their infants than mothers of normal infants, but were similar in exhibiting high quality and appropriate interactions, (3) the quality and appropriateness of maternal interactions with their infants did not appear to be specifically associated with their infant's attention, affect, or movement patterns, however, the handicapped infant's neuromotor abilities were related to the amount of maternal involvement, (4) the presence of depressive symptomatology was not significantly different between the maternal groups, nor was it associated with specific infant characteristics, and (5) early intervention had a facilitative effect on patterns of mother-child interaction.

Interpretation of Major Findings

It was hypothesized that normal and handicapped infants would differ in their presenting characteristics to caregivers when videotaped under semi-structured laboratory play conditions. Specifically, it was expected that handicapped infants would obtain higher risk points for neuromotor pathology and exhibit more looking away, more negative affect and less positive affect during mother-child interaction. With the exception of positive affect, this hypothesis was supported by the results reported in this study.

When interacting with their mothers, the looking patterns of both handicapped and normal infants at approximately 11 months of age were characterized by more looking toward toys than looking toward mother. Handicapped infants, however spent more time

"looking away" than normal infants, possibly because they required greater information processing time, or because of the influence of other infant characteristics. The handicapped child's total neuromotor risk score was significantly correlated with infant looking away. The influence of abnormal tone and aberrant movement patterns may have inhibited the infant's ability to direct his gaze. It should be noted that an infant was observed to "look away" anytime he was not looking at his mother or toys. Normal infants were observed to look away most often when they were glancing over a series of toys before focusing on one in particular, or when they looked around the room surroundings. In contrast, some of the handicapped infants spent long periods of time staring "vacantly" at nothing in particular. These infants appeared to be less interested in their surroundings. None of the normal infants was observed to engage in this "vacant" looking behavior. Although these qualitative differences were not considered in the coding system used in this study, this differentiation in looking behavior may be important to consider in future studies. Presumably, mothers would react to these two looking away patterns differently.

The sum of the neuromotor risk points was significantly higher in the sample of handicapped infants. With the exception of one infant, all of the handicapped infants were characterized by some delay in motor skills. Ninety percent were also characterized by deviant or absent movement patterns. That is, not only were motor milestones, such as head control or sitting alone,

delayed, but when they did appear they showed atypical patterns. A notable example is the child who was able to lift his head but needed to rest the back of his head on his neck in order to maintain its control. In part, these deviations in motor patterns are due to the influence of abnormal postural tone. Of the four subscales of the MAI, muscle tone was most abnormal in the handicapped sample. Abnormal tone has been reported to influence the child's expression of positive affect (Cicchetti & Stroufe, 1978; Gallagher, Jens & O'Donnell, 1983). Yet, in the handicapped sample reported here, neither muscle tone nor the total neuromotor risk score was significantly correlated with the amount of expressed positive affect. Both muscle tone and the overall risk score, however, were associated with positive affect in the normal sample. One reason for this difference in findings may be attributed to the context in which positive affect was observed. Most studies which have examined the expression of positive affect with atypical infants have been based on experimental situations (Cicchetti & Stroufe, 1978; Gallagher, Jens, & O'Donnell, 1983). In these studies delays and differences in the affective behavior of the handicapped infants were reported. The context in this study was quite different from these experimental situations. As Vietze (in press) recently pointed out, experimental situations reflect what is possible in affective behavior while naturalistic observations reflect what is typical. It is probable that mothers in both samples were equally skilled at eliciting positive affect from their children. From the pro-

cedures used in this study, it is unclear whether one group of mothers spent more time specifically trying to elicit this type of behavior. If, for example, the mothers of the handicapped infants attempted to elicit these behaviors more often than mothers of normal infants, it would not only reflect a difference in maternal interactive style, it would also contribute to higher levels of affect in the infants.

Another diff ence between the groups of infants was in the expression of negative affect. Handicapped infants exhibited significantly greater amounts of crying and fussing than normal infants. Although normal infants rarely cried, when they did, it was most often in response to something, e.g., falling over the edge of the mat. Handicapped infants, on the other hand, most often cried in ways which were not obviously a consequence of other events.

While differences and similarities between groups of infants were noted, one must not lose sight of within group variability. The range of differences in behavior within the handicapped sample, in particular, was quite large. For example, neuromotor risk scores in the handicapped sample ranged from scores well within normal limits to highly abnormal scores. This range was more restricted in the normal sample.

It should also be noted that while quality of movement was considered in the neuromotor score, it was not a consideration in the coding of looking patterns or affect. Quality of affect, in particular, has been noted to differ in samples of handicapped

and normal infants (Cicchetti & Stroufe, 1978). It is quite possible that the quality of these patterns was different for the two samples.

A second hypothesis in this study was that mothers of the two groups of infants would differ in their interaction styles. This hypothesis was based on previous research which characterized mothers of handicapped children as more controlling and directive in interactive style when compared to mothers of normal children. These results had been obtained when investigators matched the children on either chronological age or a developmental variable. The interpretation of mothers of handicapped children as more controlling and directive is generally based on the frequency or amount of maternal directive statements and maternal lead-taking in interactions. The results of this study with handicapped infants further confirm the previous investigations. In this study, mothers differed in the amount of their interactive behavior, the mothers of handicapped infants demonstrating more of the observed behaviors than mothers of normal infants. These observed maternal behaviors included greater amounts of lead-taking in interactions (i.e., deciding which toy or activity the child would play), increased directiveness of specific infant behaviors (e.g., prompting the child to shake a toy rather than mouth it), and more physical and verbal interaction with their infants than mothers of normal infants. These specific maternal behaviors have been identified in the literature as contributing to the characterization of maternal

interactive style as "directive" and "controlling" (Cunningham, et.al, 1981; Dunst, 1980; Eheart, 1982, Jones, 1980).

One explanation for these results may be that this increase in maternal directiveness represents an interaction style unique to mothers of developmentally different children. Mothers of handicapped infants may feel as if the onus is upon them to arrange the environment and "make things happen" for their children. According to Bromwich (1981), the hypothesized increase in amount and intensity of maternal interaction with their developmentally delayed children may result from the mother's eagerness to overcome the child's handicap by sheer intensity of effort.

Many researchers believe that this intensity in a mother's interactive behavior does not allow her to be sensitive to some of the child's more subtle cues (Bromwich, 1981; Kogan, Wimberger, and Bobbitt, 1969). The tacit assumption has been that mothers who are directive and controlling cannot be sensitive and appropriate in their interactions. The results from this study, however, do not support this assumption. Although ratings on the amount of interaction differed for mothers of normal and mothers of handicapped infants, ratings of quality (sensitivity, intensity) and appropriateness (developmental match, contingency) of maternal interaction did not differ. Mothers in both groups were observed to be highly responsive and appropriate in their interactions with their children.

More recently, however, it has been suggested that direct-

iveness and sensitivity may not be completely orthogonal constructs (Crawley and Spiker, 1983). Mothers who combine sensitivity and directiveness in ways that are appropriate to the child's developmental level may well provide the highest stimulation value. In this study, mothers of handicapped infants appeared to view the behavior patterns of their children as signals to which they must be even more sensitive. They responded to subtle signals of interest and activity, allowing the infant more time in which to initiate or respond.

For several handicapped infants, the behavior patterns they exhibited were not merely delayed patterns reflecting a normal, yet slowed, developmental progression. Instead their behavior was quite deviant or altogether absent. For example, three infants exhibited hypertonicity and asymmetry in postural tone which inhibited the integration of primitive reflexes and the development of normal movement patterns. This type of behavior is very atypical, and would never be present in this extreme form in the normal infant. Two infants looked at their mother or at toys for only 43 and 126 seconds, respectively, out of a total of 1200 seconds. The majority of time was spent looking at apparently nothing in particular. Although not blind in terms of structural deviations, directed looking behavior in these infants was absent. Both of these examples of deviant or absent behavior are quite abnormal; that is, they are not representative of the normal developmental progression. In these cases - - and there are many other such examples of deviant or

absent behavior in this sample - - mothers may increase their structuring and control of the child's behavior as an adaptation to infant characteristics. In order for the mother to obtain any response, she may need to become quite intense and controlling in her behaviors for any interaction to occur (Goldberg, 1982).

A third hypothesis of this study was that these infant characteristics would be associated with maternal behavior patterns. Implicit in this hypothesis was the notion that the more deviant the child's behavior, and therefore the less readable his signals, the more difficult it would be for the mother to respond appropriately. Interestingly, none of the infant characteristics examined were associated with the quality or the appropriateness of maternal interactions. Only neuromotor risk was associated with the amount of maternal interaction in the handicapped sample. It should be noted that the correlations obtained between neuromotor risk and the amount of maternal behavior in both samples of infants were similar although only the correlation for the handicapped sample reached significance. Caution must be taken in interpreting these correlations since the sample size of this study was quite small thereby producing correlations which may be unstable. For example, while the correlation of neuromotor risk was significantly correlated to amount of maternal interaction in the handicapped sample, the correlation of negative affect with maternal interaction only approached significance. In the normal sample, the relationship of maternal interaction with neuromotor risk as well as with

negative affect only approached significance. Because of the instability of correlations with small samples, negative affect in another sample may have been significant instead of neuromotor risk.

There are several possible explanations for the relatively minimal relationship found between infant characteristics and maternal interactive behaviors. The first possibility is that maternal interactive behaviors were associated with infant characteristics other than those measured in this study. Although the data presented from this study do not strongly support a relationship between specific child characteristics and maternal interactive behavior, the results do not necessarily preclude such a relationship. For instance, a recent study using the same observational measure to rate maternal behavior as used in this study found that the interactive behaviors of mothers of handicapped infants was associated with the temperamental characteristics of the child (Huntington & Simeonsson, 1984). In this report mothers receiving the lowest ratings had handicapped children characterized as exhibiting "slow to warm up" temperaments. A normal contrast sample was not included in the Huntington and Simeonsson study so it is not known whether this same pattern would have been found in mothers of normally developing infants.

Another possible explanation is that the behavior of mothers of infants, in general, is unrelated to specific child characteristics. Instead, their behavior may be the result of their

perception of the child's abilities or their knowledge of the child's diagnosis. According to Parke (1978), an important determinant of parent-infant interaction is the parent's own assumptions about the infant's capabilities. Differences in parent's attitudes, perception, cognitions and knowledge will have an influence on the nature of the infant's behaviors that are responded to and the types of behavior that the parent will engage in. A mother of a handicapped infant may increase the intensity of her interactions because she realizes her child is delayed and needs special care and attention. The fact that her child exhibits increased fussiness or atypical muscle tone may not factor into her behavior per se. Mothers of young infants expect a certain amount of variability in their infants' behavior. Since infants are expected to vary in temperamental and personality characterisitcs, mothers may respond to this variability in ways that are unrelated to whether their infant is handicapped or not.

Another explanation for the similar ratings between groups of mothers regardless of infant characteristics could be due to the influence of early intervention in the handicapped sample. When mothers were grouped according to the type of early intervention services (i.e., systematic or periodic) their infant was receiving, significant differences were found in maternal interactive behaviors. These results suggest that the breadth and intensity of early intervention services are an important factor in the observations of maternal behavior with their

handicapped infants. Infants receiving the more intense level of services, regardless of their developmental status, had mothers who received higher ratings on the observational rating instrument than mothers and handicapped infants receiving the more periodic services.

These are interesting results in light of the traditional focus of early intervention with handicapped young children. The majority of intervention programs focus upon changes in the child's development and use these changes as an index of their efficacy. It should be noted, however, that regardless of the stated focus of an intervention program, most interventionists do not work with the child in isolation. Rather, they have adopted a systems approach in which parents, siblings, and extended family members are considered important components of the intervention process (Kysela and Marfo, 1984). Furthermore, they very often offer other services to family members, including parent support groups, parent education classes, and individual counseling on an as needed basis. A beneficial byproduct of systematic early intervention may be the positive influence on maternal interactions with their children. This may be the result of professionals assisting caregivers in reading infant cues in order to provide appropriate learning experiences, or the provision of social support services. It is likely, however, to be a combination of these two factors.

A final hypothesis of this study was that symptoms of depression would be higher in mothers of handicapped infants than

mothers of normal infants, and that specific infant characteristics would be related to this symptomatology. This hypothesis was based on previous research which indicated that families of handicapped children often experience elevated levels of stress, and that specific characteristics of the child have been shown to be important contributors to the amount of stress reported. As it turned out, none of the infant characteristics examined in this study was related to maternal depression in either sample. Nor were significant differences found between groups in reported depression, although there was a trend toward increased symptomatology in mothers of handicapped infants. Several comments must be made regarding this lack of significant findings. First, for unknown reasons, mothers of normal infants exhibited a higher incidence of depression than one would predict from the general population. Reports range from 3% of the general population that fall within the range of serious psychopathology (Levitt & Lubin, 1975) to 15% of the general population that cite symptoms of a depressive nature (Mellinger, Balter, Mannheimer, Cosin & Parry, 1978). The incidence of mothers at risk for depression in the normal sample was 22% as defined by scores obtained on the CES-D, the depression measure used in this study. This is considerably higher than one would expect. Since these mothers should have been past the period known as "baby blues", it is not known why these mothers reported higher levels of depressive symptomatology. The depression scores in both samples of mothers were not significantly correlated with variables typically related to

depression in women, including age, education, income, nor were these scores correlated with infant characteristics, including the infant's neuromotor risk status, looking patterns, affect, and cognitive level. These scores, then, were attributable to factors other than those considered in this study.

It should be noted that depression may be only one manifestation of the stress associated with raising a handicapped child. Other manifestations include marital problems, increased physical illness, psychosomatic complaints, and impaired social functioning. It is quite possible that mothers of handicapped infants were experiencing increased stress related to raising a handicapped child. However, the manifestation of this stress may have been present in a form other than depressive symptomatology, e.g., marital problems.

Limitations of the Present Study and Suggestions for Future Research

The results of this study suggest some similarities and differences in both infant and maternal interactive behaviors, some of which are consistent with previous research. However, the sample size on which the results of this study are based is small and caution must be exercised in interpreting and in generalizing from them. The present study should be replicated with a larger sample of subjects. If the results of such a study are consistent with those of the present study, greater confidence could be placed in making generalizations based on the present results.

In this study, mothers of handicapped infants were observed to engage in greater amounts of behaviors identified in the literature as directive and controlling (Crawley & Spiker, 1983; Dunst, 1980; Jones, 1980). While these results were similar to results reported in other studies, the accompanying assumption that increased directiveness results in decreased sensitivity of maternal behavior was not supported. It may be that differences were not found due to the small sample size and the restricted sample of mothers which resulted in more similarities than differences regardless of the variability in their children. None of the families in this study was clearly disadvantaged. Different results might have been obtained with a larger, more diverse sample.

The context in which mothers and infants were observed may have been a contributing limitation to this study. Observations were conducted in a laboratory playroom under semi-structured conditions. The laboratory playroom was set up in the exact same way for each dyad with a standard set of toys available. Mothers were given the same set of statements: a) we were interested in the play of their infants with toys and with them, b) they were being videotaped, and c) they should do whatever they would typically do at home given twenty minutes of free time with their infant. Attempts were made to create a non-threatening, comfortable atmosphere (e.g., taping did not begin until the mother and infant appeared comfortable with the procedure, the camera and attendant were not visible). In some respects these conditions

may be considered "artificial" in that the play session was conducted in strange surroundings with "new" toys and each dyad was videotaped. The fact that mothers and infants were constrained in a limited space for a predetermined time period obviously pulled for interactive behaviors. These interactive behaviors may have been atypical for the dyad considering the surroundings and the knowledge they were being videotaped. However, what was apparent in this study was that a homogeneous sample of mothers, given standard directions and conditions with which to play with their children, exhibited similarly high quality and appropriate interactions with their infants regardless of their infants' capabilities. It appeared that both groups of mothers possessed skilled interactive repertoires that were appropriate to the needs of their infants. Whether these interactive repertoires are typically executed or not is unknown.

A confounding influence in this study may have been the involvement of mothers and their handicapped infants in early intervention programs. This participation may well have resulted in increased sensitivity of these mothers to the behavioral cues of their infants. Therefore, it is possible that the results of this study may not apply to dyads with different early experiences. In order to determine the effects of these early intervention experiences, mother-child interactions should be observed prior to the beginning of these services, and then several months later. Research on this issue is currently being

conducted in Canada and the results of this longitudinal work may shed some light on the nature of this influence (Kysela & Marfo, 1984).

This study examined the interaction patterns of young infants at one age. It is likely that the similarities observed in mother-child relationships between normal and handicapped infants at this young age may change as the child grows older, or the subtle results noted in this study may become more pronounced over time. Maternal depressive symptomatology may likewise become more pronounced with time. Longitudinal investigations of these relationships are necessary in order to understand the nature of these relationships as they develop and change.

A logical extension of the present study would be to look more in depth at the adaptation of maternal behavior to infant characteristics. For example, what types of strategies do mothers use to elicit their child's attention, how do they maintain it? This information would be useful in assisting early intervention specialists in targeting intervention objectives and strategies.

Educational Implications

A striking implication from this study is that the findings support a model of early intervention which focuses on the quality and appropriateness of the mother-child relationship. In this study, mothers receiving systematic intervention were rated much higher on the observational rating system than were mothers receiving periodic services. These results suggest that a

positive byproduct of traditional intervention services, which focus primarily on child progress, may be an increase in responsive and contingent maternal interactions.

Early intervention services are varied in their approaches. While some are now focusing specifically on the family, the majority continue to focus primarily on developmental changes in the child. In this sample, it may be that the traditional child-centered intervention services, when delivered systematically, were enough to make a difference in the quality of the mother-child relationship. This will not always be the case. Information gathered from clinical and research reports suggest that parents differ in their ability to recognize and respond to infant cues (Goldberg, 1977; Parke, 1978). Handicapped infants often exhibit ambiguous signals which are difficult for caregivers to read and interpret. Therefore, intervention may be able to facilitate the development of more effective mother-child relationships by assisting caregivers in reading their child's behavioral cues and structuring their interchanges with the child. This direct approach to modification of maternal responses to infant signals may be an important aim of intervention.

This approach is consistent with the programs of intervention described by Bromwich (1981) and McCollum (1984). In these programs, the emphasis is on global interactive and affective behaviors between mother and child. The function of intervention is to help the parent make choices in her actions toward the infant that will favor the quality and mutuality of the inter-

action while helping the parent acquire responsivity and understanding of the child's needs in all developmental areas.

Mothers and infants are varied in their interactive styles and behavioral characteristics. The variance among individual dyads argues strongly for intervention programming that is tailored around the specific needs of individual mothers and infants. For example, mothers may vary in their ability to match their interactions to their child's developmental level. Some mothers intuitively know how and what to teach their children in a manner that is compatible with the idiosyncratic nature of the child's behavior. Other mothers may know what to teach their child, but not how to go about successfully doing so. It may be that the mother does not allow her child a long enough response time, or misinterprets the child's looks away as disinterest when this behavior may actually reflect the child's need for greater information processing time. These examples illustrate the need for varied and individualized intervention approaches, and more importantly, an adequate way to systematically assess the mother-child interaction. One assessment approach may involve the application of a rating scale similar to the one used in this study. This rating scale would assist the professional in pinpointing areas of strength and weakness in the mother-child relationship. Using this scale as an assessment measure coupled with the curricula approaches described by Bromwich (1981) and McCollum (1984) may well constitute an effective intervention approach.

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APPENDIX A: Measures

PARENT CHILD INTERACTION SCALE

Training Manual
Scoring Conventions
Scale Copy

Developed by:

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Revision of:
The Jay Scale (1980)
The Jay-Farran Scale (1981)

September, 1984

A. PHYSICAL INVOLVEMENT

1. AMOUNT OF BODILY CONTACT (INCLUDES SUPPORT, TOUCHING, HOLDING)

1	2	3	4	5
none; P and C never touch each other		moderate; P and C are in physical contact mostly in the service of other activities		very much; constant

2. QUALITY OF PARENT HANDLING OF CHILD (INCLUDES CHANGING CHILD'S POSTURE, GUIDING MOVEMENTS, CARRYING)

1	2	3	4	5
never sensitive, well-executed handling; almost always rough, abrupt, ineffective		sometimes sensitive handling; about half-the-time		almost always sensitive, well-executed handling; never rough, abrupt

_____ not observed

3. APPROPRIATENESS OF PARENT POSITIONING OF CHILD: PLACEMENT OF C IN A PARTICULAR POSTURE FOR THE PURPOSE OF PLAY OR INTERACTION (e.g., SITTING, STANDING, LYING)

1	2	3	4	5
always positioned inadequately or awkwardly, impeding C's best approach to task		sometimes positioned adequately; about half-the-time		almost always positioned adequately for C's best approach to task

_____ not observed

B. VERBAL INVOLVEMENT

1. AMOUNT OF VERBAL INVOLVEMENT (INCLUDES INITIATING AND/OR RESPONDING TO C'S VERBAL OR NON-VERBAL BEHAVIOR)

1	2	3	4	5
none; P seldom talks to C		moderate; P occasionally talks to C; about half-the-time		very much; P talks to C throughout session/visit

2. QUALITY OF VERBAL INTERACTION

1	2	3	4	5
P never adjusts speech to C's level - either too high or too low		moderate adjustment for comprehension; sometimes language directed to child too "babyish" or too complicated		P almost always assures C's comprehension of talk directed to C; P repeats for clarity

_____ not observed

3. APPROPRIATENESS OF VERBAL INTERACTION

1	2	3	4	5
non-contingent talk; P hardly ever comments on C's activities or P's own activiites relative to C		moderate contingency; P occasionally directs his/her talk to C about C's activities relates P's activities to C		contingent talk; P's talk almost always related to C's activity and/or explaining P's own activities relative to C

_____ not observed

C. RESPONSIVENESS OF CAREGIVER TO CHILD

1. AMOUNT OF RESPONSIVENESS TO C, TO HIS INITIATIONS, VERBALIZATIONS, DEMANDS, DISTRESS

1	2	3	4	5
P never responds		P occasionally responds; responds about half-the-time		P almost always responds

2. QUALITY OF CAREGIVER RESPONSIVENESS: INTENSITY

1	2	3	4	5
responds abruptly, forcefully, very intensely, harshly		neutral; response not intense at all		P responds in a gentle, sensitive positive manner. P may respond enthusiastically, with delight

_____ not observed

3. APPROPRIATENESS OF CAREGIVER RESPONSIVENESS: TIMING

1	2	3	4	5
seldom synchrony of response; P overwhelms C with quickness of response, or is too slow in response		moderate synchrony of response to C's needs. About half the time P's response appropriate to C's needs		response to C almost always appropriate to C's needs. Good synchrony of response--neither too quick nor too slow

_____ not observed

D. PLAY INTERACTION

1. AMOUNT OF PLAY INTERACTION: REFERS TO ATTENTION/INTERACTION OF BOTH PARENT AND CHILD TO TOY/ACTIVITY --MAY INCLUDE TEACHING DONE IN A PLAY FORMAT BUT EXCLUDES ROUTINE CHILD CARE (e.g., DIAPERING, FEEDING)

1	2	3	4	5
very little to none		moderate; about half-the-time		almost always

2. QUALITY OF PLAY BETWEEN PARENT AND CHILD: SYNCHRONY OF PLAY TERMINATION

1	2	3	4	5
P and C never ready to terminate play simultaneously		P and C sometimes ready to terminate play simultaneously; about half-the-time		P and C almost always ready to terminate play simultaneously

_____ not observed

3. APPROPRIATENESS OF PLAY INTERACTION

1	2	3	4	5
P never adapts; P persistently uses toys or activities conventionally		P sometimes adapts toys/activities to C's level; about half-the-time		P constantly uses or adapts toys/activities to C's level

_____ not observed

E. TEACHING BEHAVIOR

1. AMOUNT OF TEACHING BEHAVIOR: FOR THE PURPOSE OF TEACHING A PARTICULAR SKILL

1	2	3	4	5
very little to none		moderate; P occasionally teaches		almost always

2. QUALITY OF TEACHING BEHAVIOR

1	2	3	4	5
P subjects C to constant and vigorous teaching; almost all is routinized		some teaching is spontaneous, off-the-cuff, creative; some is routinized, drill-oriented		teaching is almost always spontaneous, originating from C's activities, interests or developmental capabilities

_____ not observed

3. APPROPRIATENESS OF TEACHING BEHAVIOR

1	2	3	4	5
teaching tasks do not match C's learning needs. P unmindful of C's developmental capabilities		P sometimes teaches tasks that are appropriate to C's developmental capabilities; about half-the-time		P provides novelty in her teaching tasks; P encourages C to limits of his/her developmental capabilities

_____ not observed

F. STRUCTURING OF CHILD'S ACTIVITIES

1. AMOUNT OF STRUCTURE DURING PLAYFUL INTERACTIONS, TIME ALLOCATION: CONTROL AND STRUCTURE OF CHILD'S ACTIVITIES

1	2	3	4	5
P never structures C's activities		P sometimes structures C's activities; about half-the-time		P almost always structures C's activities

2. QUALITY OF STRUCTURE: VOLUNTARY ENERGY OUTPUT

1	2	3	4	5
P does only what is required or sometimes less than what is required for C's minimal maintenance		P sometimes does extras, sometimes just the minimum		P's devotion of time and energy almost always surpasses the level required for minimal maintenance of C

3. APPROPRIATENESS OF STRUCTURE: WHOSE CUES ARE PURSUED

1	2	3	4	5
P is continually attempting to control C. P is domineering and manipulative. P makes all decisions about what, where and how C will spend time		moderately controlling; P tends to follow his/her own agenda, either P follows C's initiatives about half-the-time, OR P is uninvolved with C and pursues P's own separate activities		almost always appropriate structuring of C's activities. P provides guidance and support to allow C to pursue activities of interest

G. STRUCTURING OF CHILD'S SPECIFIC BEHAVIORS WITHIN AN ACTIVITY

1. AMOUNT OF DETAILED STRUCTURE IMPOSED BY P: DIRECTIVENESS OF SPECIFIC BEHAVIORS

1	2	3	4	5
P's directives are the minimum necessary to guide C's behaviors- OR P never structures C's specific behaviors		P sometimes provides direction more than necessary; about half-the-time		P almost always directs C's specific behaviors more tnan necessary

2. QUALITY OF STRUCTURING: INTENSITY OF DIRECTIVES

1	2	3	4	5
very rough; P's directing statements are almost always very forceful and compelling		moderate; P's directives are neutral or of mixed intensities, some forceful and some low-key		very low; P's directives are almost always low-key and gentle, or else non-existent

_____ not observed

3. APPROPRIATENESS OF STRUCTURING: REASONABLENESS OF CONTROL/DEMANDS

1	2	3	4	5
P's demands are never reasonable or sensitive to C's abilities		P's demands occasionally are reasonable and sensitive; about half-the-time		P's demands are almost always reasonable, appropriate and sensitive to C's abilities

_____ not observed

H. SEQUENCING OF ACTIVITIES

1. AMOUNT OF SEQUENCING: RELATION OF ONE ACTIVITY TO ANOTHER TO MAINTAIN C'S INTEREST APPROPRIATE TO C'S ENERGY AND DEVELOPMENTAL LEVEL

1	2	3	4	5
activities which follow each other are almost never related		activities which follow each other are sometimes related; about half-the-time		activities which follow each other are almost always related

2. QUALITY OF SEQUENCING

1	2	3	4	5
P's sequencing of activity lacks smoothness and fluidity; activities seem to begin and end rather than flow		moderate fluidity and smoothness of sequencing; about half-the-time		P almost always sequences activities so there is smooth continuity among related activities; P elaborates of C's activities in natural order

3. APPROPRIATENESS OF SEQUENCING

1	2	3	4	5
P never sequences activities from simple to complex, or introduces change to maintain C's interest; activities seem unrelated and confusing		sometimes P sequences activities for example, from simple to complex, or introduces change; about half-the-time		P almost always sequences activities appropriately, for example, from simple to complex, or introduces change to maintain C's interest

I. POSITIVE EMOTION

1. AMOUNT OF EXPRESSED POSITIVE EMOTION, VERBAL AND NON-VERBAL (PRAISE, HUGS, SMILES)

1	2	3	4	5
none; P never expresses positive emotion		moderate; P expresses positive emotion about half-the-time		very much; P expresses positive emotion very frequently

2. QUALITY OF EXPRESSED POSITIVE EMOTION: INTENSITY

1	2	3	4	5
withdrawn, detached, no positve emotion, OR extremely overwhelming, intrusively positive		moderate intensity; sometimes detached or intrusive; sometimes high quality		loving, warm; variations in quality dependent on child behaviors; always high quality

_____ not observed

3. APPROPRIATENESS OF POSTIVE EMOTION: TIMING

1	2	3	4	5
P expresses positive emotion at inappropriate times, non-contingently, or in inappropriate excess.		sometimes inappropriate, sometimes appropriate contingency.		positive emotion; almost always appropriately timed to child behavior

_____ not observed

J. NEGATIVE EMOTION

1. AMOUNT OF EXPRESSED NEGATIVE EMOTION, VERBAL AND NONVERBAL (CRITICISM, THREATS, HITS, IRRITABILITY, SHARPNESS)

1	2	3	4	5
none; P never expresses negative emotion		moderate; P expresses negative emotion about half-the-time		very much; P expresses negative emotion very frequently

2. QUALITY OF EXPRESSED NEGATIVE EMOTION: INTENSITY

1	2	3	4	5
intensely negative; P uses physical punishment often unjustified, severely harsh tone of voice		moderate intensity; P occasionally uses harsh tone of voice; sometimes P seems impatient, sharp		P uses negative emotion only when justified with appropriate intensity; may frequently use reasoning to control behavior

_____ not observed

3. APPROPRIATENESS OF NEGATIVE EMOTION: TIMING

1	2	3	4	5
P expresses negative emotion non-contingently, or in inappropriate excess		sometimes inappropriate, sometimes appropriate contingency.		negative emotion almost always appropriately timed to C's behavior

_____ not observed

K. GOAL SETTING

1. AMOUNT OF PARENTAL GOAL SETTING BEHAVIOR: DEGREE TO WHICH P VERBALLY OR NON-VERBALLY COMMUNICATES EXPECTATIONS FOR C'S BEHAVIOR

1	2	3	4	5
none; P never sets goals for C		moderate; P occasionally set goals for C; about half-the-time		very frequently; P continually sets goals for C

2. QUALITY OF GOAL SETTING: P'S OVERALL FLEXIBILITY, ABILITY TO ADJUST SELF, ENVIRONMENT, OR CHILD SO THAT C WILL MEET SUCCESS AT ANY ACTIVITY

1	2	3	4	5
P never adjusts demands, environment, toys, to aid C's success		P sometimes is flexible		P almost always adjusts to aid C's success

3. APPROPRIATENESS OF GOAL SETTING: REASONABLENESS OF P'S EXPECTATIONS FOR C'S BEHAVIOR

1	2	3	4	5
P never sets attainable, reasonable challenges for C; P unmindful of C's ability levels		sometimes P's challenges are attainable; about half-the-time		P's challenges are almost always moderate, attainable, and appropriate to C's capabilities

Scoring Sheet
for
MOVEMENT ASSESSMENT OF INFANTS
with
Four-Month Profile

Name _____ Date of exam _____

Case number _____ Birth date _____

Examiner _____ Chronological age _____

Gestational age _____

Total risk score ☐ Corrected age _____

MUSCLE TONE

Items 1-6, 9, and 10 should be coded by the scale below.
Code items 7 and 8 as explained in the instructions for these items in the manual.

0 - Item omitted
1 - Hypotonic
2 - Greater than hypotonic but less than normal
3 - Normal
4 - Greater than normal but less than hypertonic
5 - Hypertonic
6 - Fluctuating, variable

			Distribution Variations		Asymmetries		
			Upper	Lower	Left	Right	
1 2 4 5 6	____	1. Consistency	____	____	____	____	1.
1 2 4 5 6	____	2. Extensibility	____	____	____	____	2.
1 2 4 5 6	____	3. Passivity	____	____	____	____	3.
1 2 4 5 6	____	4. Posture in Supine	____	____	____	____	4.
1 2 4 5 6	____	5. Posture in Prone	____	____	____	____	5.
1 2 4 5 6	____	6. Posture in Prone Suspended	____	____	____	____	6.
3 4	____	7. Asymmetry					
3 4	____	8. Distribution Variation					
1 2 4 5 6	____	9. Summary of Tone - Extremities	____	____	____	____	9.
1 2 4 5 6	____	10. Summary of Tone - Trunk	____	____	____	____	10.

☐

PRIMITIVE REFLEXES

Items 1-12 should be coded by the scale below.
Code items 13 and 14 as explained in the instructions for these items in the manual.

0 - Item omitted
1 - Integrated or not elicited
2 - Incomplete response
3 - Complete response
4 - Dominant

			Asymmetries		
			Left	Right	
2 3 4	____	1. Tonic Labyrinthine Reflex in Supine	____	____	1.
2 3 4	____	2. Tonic Labyrinthine Reflex in Prone	____	____	2.
3 4	____	3. Asymmetrical Tonic Neck Reflex - Evoked	____	____	3.
3 4	____	4. Asymmetrical Tonic Neck Reflex - Spontaneous	____	____	4.
3 4	____	5. Moro	____	____	5.
3 4	____	6. Tremulousness	____	____	6.
3 4	____	7. Palmar Grasp	____	____	7.
4	____	8. Plantar Grasp	____	____	8.
3 4	____	9. Ankle Clonus	____	____	9.
3 4	____	10. Neonatal Positive Support	____	____	10.
3 4	____	11. Walking Reflex	____	____	11.
3 4	____	12. Trunk Incurvation (Galant)	____	____	12.
3 4	____	13. Asymmetry			
3 4	____	14. Summary of Primitive Reflexes			

☐

AUTOMATIC REACTIONS

Items 1-14 should be coded by the scale below.
Code items 15 and 16 as explained in the instructions for these items in the manual.

0 - Item omitted
1 - Complete and consistent response
2 - Incomplete or inconsistent response
3 - Partial response
4 - No response

			Asymmetries		
			Left	Right	
3 4	____	1. Head Righting - Lateral	____	____	1.
2 3 4	____	2. Head Righting - Extension	____	____	2.
3 4	____	3. Head Righting - Flexion	____	____	3.
4	____	4. Landau	____	____	4.
4	____	5. Rotation in Trunk	____	____	5.
4	____	6. Equilibrium Reactions in Prone	____	____	6.
	____	7. Equilibrium Reactions in Sitting	____	____	7.
	____	8. Equilibrium Reactions in Vertical Suspension	____	____	8.
	____	9. Downward Parachute	____	____	9.
	____	10. Protective Extension - Forward	____	____	10.
	____	11. Protective Extension - Side	____	____	11.
	____	12. Protective Extension - Backward	____	____	12.
3 4	____	13. Placing of Feet	____	____	13.
3 4	____	14. Placing of Hands	____	____	14.
3 4	____	15. Asymmetry	____	____	15.
3 4	____	16. Summary of Automatic Reactions	____	____	16.

VOLITIONAL MOVEMENT

Items 1-23 should be coded by the scale below.
Code items 24 and 25 as explained in the instructions for these items in the manual.

0 - Item omitted
1 - Complete and consistent response
2 - Incomplete or inconsistent response
3 - Partial response
4 - No response

			Asymmetries		
			Left	Right	
4	____	1. Hearing	____	____	1.
3 4	____	2. Visual Following	____	____	2.
3 4	____	3. Peripheral Vision	____	____	3.
4	____	4. Vocalization	____	____	4.
2 3 4	____	5. Head Centering	____	____	5.
3 4	____	6. Head Position - Anterior/Posterior	____	____	6.
3 4	____	7. Head Balance	____	____	7.
3 4	____	8. Active Weight Bearing Through Shoulders	____	____	8.
3 4	____	9. Open Hands	____	____	9.
3 4	____	10. Hands to Midline	____	____	10.
	____	11. Large Grasp	____	____	11.
	____	12. Small Grasp	____	____	12.
	____	13. Reaches Out	____	____	13.
	____	14. Combines	____	____	14.
	____	15. Transfers	____	____	15.
4	____	16. Back Straight in Sitting	____	____	16
	____	17. Active Use of Hips	____	____	17.
	____	18. Rolling	____	____	18.
	____	19. Prone Progression	____	____	19.
	____	20. Site When Placed	____	____	20.
	____	21. Coming to Sit	____	____	21.
	____	22. Coming to Stand	____	____	22.
	____	23. Walking	____	____	23.
3 4	____	24. Asymmetry	____	____	24.
3 4	____	25. Summary of Volitional Movement	____	____	25.

THE PAST WEEK
(Radloff, 1975)

DIRECTIONS: Below is a list of the ways you might have felt or behaved. Please tell me how often you have felt this way during the past week.

		Rarely or none of the time (less than one day)	Some or a little of the time (1-2 days)	Occasionally or a moderate amount of time (3-4 days)	Most or all of the time (5-7 days)
1.	I was bothered by things that usually don't bother me.	1	2	3	4
2.	I did not feel like eating; my appetite was poor.	1	2	3	4
3.	I felt that I could not shake off the blues even with help from my family or friends.	1	2	3	4
4.	I felt that I was just as good as other people.	1	2	3	4
5.	I had trouble keeping my mind on what I was doing.	1	2	3	4
6.	I felt depressed.	1	2	3	4
7.	I felt that everything I did was an effort.	1	2	3	4
8.	I felt hopeful about the future.	1	2	3	4
9.	I thought my life had been a failure.	1	2	3	4
10.	I felt fearful.	1	2	3	4
11.	My sleep was restless.	1	2	3	4
12.	I was happy.	1	2	3	4
13.	I talked less than usual.	1	2	3	4
14.	I felt lonely.	1	2	3	4
15.	People were unfriendly.	1	2	3	4
16.	I enjoyed life.	1	2	3	4
17.	I had crying spells.	1	2	3	4
18.	I felt sad.	1	2	3	4
19.	I felt that people dislike me.	1	2	3	4
20.	I could not get "going."	1	2	3	4

APPENDIX B: Presentations

RESEARCH PRESENTATIONS PARTIALLY SUPPORTED BY GRANT

1. Kasari, C., Farran, D., & Harber, L. (1984, March). Variability of infant social-communicative behavior in caregiver-infant interactions. Paper presented at the Gatlinburg Conference on Research in Mental Retardation and Developmental Disabilities, Gatlinburg, Tennessee.

2. Kasari, C., Farran, D., & Harber, L. (1984, April). The Parent-Child Interaction Scale: A new clinical instrument. Paper presented at the fourth biennial International Conference on Infant Studies, New York, New York.

3. Kasari, C. (1984, October). Early intervention with handicapped infants and their mothers: The role of infant characteristics, social support and stress. Paper presented at the Third Annual Idaho Conference on Early Intervention for Young Developmentally Disabled Children, Pocatello, Idaho.

4. Kasari, C. & Farran, D. (1984, December). Early intervention and caregiver-handicapped infant interaction. Paper presented at the Conference on Comprehensive Approaches to Disabled and At-Risk Infants, Toddlers and their Families, Washington, D.C.

Variability of Infant Social-Communicative Behavior in Caregiver-Infant Interactions

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Paper presented at the 1984 Gatlinburg Conference on Research in Mental Retardation/Developmental Disabilities, Gatlinburg, Tennessee, March, 1984. This research was supported, in part, by Grant #G008302184, Office of Special Education, Department of Education.

Variability of Infant Social-Communicative

Behavior in Caregiver-Infant Interactions

In general, every parent-child interaction involves adaptation by the parent to the child's characteristics. For instance, we know that children's temperament varies and parents adapt to it. Certainly the kind of conditions that a severely-handicapped infant presents create a sometimes radically different set of adaptations by the parent.

One of the differentiating characteristics between "normal" and handicapped infants is the lack of clarity in the handicapped child's signals. Handicapped infants are frequently less readable in their cues than other infants, which may mislead parents, and make synchronous interaction hard to achieve. Yet, the way in which the atypical infant's characteristics might affect the parent's interpretation has received relatively little attention.

The data we will present are on 14 caregiver-infant dyads in order to illustrate a model of "readability." Readability has been defined by Goldberg (1977) as "the extent to which an infant's behavior is clearly defined and provides distinctive signals and cues for adults." Our model of readability presented in Figure 1 encompasses 4 dimensions of infant attributes. These particular attributes were selected because they are behaviors described in the literature which are representative of the infant's contribution in dyadic interactions, or behaviors not described in the literature on normal infant-caregiver interactions, but which are known to influence the handicapped infant's behavior. The first dimension, is neuromotor status. We were particularly interested in obtaining a qualitative estimate of a child's movements and postural tone, which may affect his or her response modes. The second attribute refers to the infant's ability to engage or maintain the

mother in interaction. The specific behaviors include the infants' looking patterns, vocalizations, and touching. The dimension, regulation, refers to the infant's latency to respond, his persistence in initiating or maintaining an interaction and state of arousal. For example, handicapped children vary substantially in their ability to respond to others within an appropriate period of time. An infant may be slow to acknowledge initiations so that his mother does not perceive his behavior as related to the previous communicative act. Or an infant may emit behaviors too quickly and perservatively hence violating turn-taking rules by not allowing the mother a chance to respond (Jones, 1980). The last infant characteristic is affect. Much attention has been paid to the affective differences between normal and handicapped children. Down syndrome babies have been described as exhibiting less intense and fewer instances of positive affect (Jones, 1977), while cerebral palsied infants have been noted to be less predictable and highly labile in affect (Morris, 1980). We are interested in the infant's positive, negative and neutral affect in interactions with his mother.

In past work related to the effect of the infant on the caregiver, we've tended to consider that effect to be a direct one. We have often ignored the fact that dyadic interaction takes place in a context of other events which may influence the family. Family theorists have long been aware of this fact and have termed a portion of these events social support. In this study we are taking into account some of the factors which may mediate the impact of the infant's characteristics on his parent's behavior toward him. Out of the many that are possible, this project is measuring social supports, both formal and informal and the division of roles in caregiving tasks. We are also looking at the type of services the family receives and the prognosis for the child.

The dimensions of infant behavior may be mediated by social supports which are then expected to impact on the parent's behavior. This impact on the parent's behavior may be reflected in their perceived level of stress and their interaction style with the child.

The results reported today are on 14 handicapped infant-caregiver dyads involved in the Parent-Child Reciprocity Project of the Carolina Institute on Early Education of the Handicapped. As you can tell from Table 1, this is primarily a middle class, well educated set of families.

Table 2 describes the children in the sample, which included 9 boys and 5 girls ranging in age from 10-12 months. Extrapolated norms published by Naglieri (1981) were used to estimate MDIs for children with MDIs less than 50. You can see that the children had a variety of diagnoses.

Mother-child sessions were conducted at the Frank Porter Graham Child Development Center. Each mother-child session lasted for 20 minutes in a carpeted laboratory play room equipped with a comfortable mat and pillows and developmentally appropriate toys. During the session the child's looking patterns were recorded live, while other behaviors were scored from the videotaped records. The movement assessment and Bayley evaluations were completed at a different session, generally one week before the mother-child play session.

Mother-infant responses on selected aspects of the model will be reported today. In Table 3 the infants' scores on the neuromotor dimension are summarized. [We used the Movement Assessment of Infants by Chandler, Andrews and Swanson (1980).] This assessment consists of 4 subscales: muscle tone, primitive reflexes, automatic reactions and volitional movement. From this assessment we assigned risk points to those behaviors the child demonstrated

but should not at his age, or those behaviors absent from his repertoire but which should be present. These points were then totaled for each subscale. To summarize the data, we separated the sample into 3 groups --those children who were crawling and fairly mobile, those children who were sitting and fairly immobile, and those children who were basically not moving.

Individual variance within each group was greatest on the volitional movement subscale, particularly among the crawlers. This subscale looks at motor milestones such as rolling and sitting and also includes fine motor skills. As a group the non-ambulatory children were the most similar to one another with all three groups demonstrating less variance among their respective members in the primitive reflexes and muscle tone subscales. In fact, all of the non-ambulatory children received the maximum number of risk points possible on the muscle tone subscale.

These data describe infants who are quite variable in their movement patterns. However, the picture is further complicated by considering that even where infants are similar in motoric skills, they may still present a very different picture to their mothers as evidenced by their looking patterns.

These looking patterns are detailed in Table 4. During the mother-child session, we recorded whether the child was looking at his mother, at a toy or away. We then calculated the proportion of the session the child spent looking in each of three categories. Both the sitters and the crawlers spent more time looking at toys than at mothers or away, with the crawlers spending 12% more time looking away and 7% less time looking at mothers than the sitters. This finding seems consistent with the crawlers' greater movement capabilities and thus greater freedom to explore their surroundings. Because

the two meningitis children were so strikingly similar in their looking patterns, we separated their scores from the others. While all of the non-ambulatory children spent a greater proportion of the session looking away, the meningitis children spent nearly the entire session (92%) looking away and only focused on toys 1% of the time.

Three mediating factors will be discussed in relation to these data. First, the number of caregiving roles, such as bathing, feeding and dressing, in which the father either substituted or assisted the mother were collected using the Child Care Role Scale (Kasari & Farran, 1985). In the ambulatory group, the father tended to substitute more than assist the mother while the opposite is true for the non-ambulatory group. This may indicate that the increased caregiving demands of a more severely involved child necessitate the combined care of two people rather than one.

Second, the number of formal and infomal supports are reported as measured by the Carolina Parent Support Scale (Bristol, 1983). This questionnaire provides data on the number of formal supports (such as social service organizations) and the number of informal supports (such as family and friends) the family utilizes. Within this sample, the number of supports utilized by the families do not vary significantly. All three groups utilized slightly more informal versus formal supports. All the families appeared to be getting adequate support.

Embedded in the formal support category are qualitative differences in the type of services the child and family receives. Interviews with the parents allowed us to classify these services as either periodic evaluations or systematic instruction. Periodic evaluations refer to infrequent intervention, or intervention of a relatively short duration; that is less

than 4 months before their initial visit to our laboratory. Systematic instruction refers to continuous and regular intervention (generally one contact per week) for greater than 5 months before their initial visit. Within each of these groups, some of these children were receiving the more intense level of services and some receiving the less intense level.

Finally, we looked at the interaction of one infant dimension (neuromotor status), one mediating variable-(type of services) and one outcome --(parental style of interaction). These data are presented in Figure 2.

On the vertical axis the average ratings on a 1-5 point scale are presented from the Parent-Child Interaction Scale (PCIS) (Farran, Kasari, & Jay, 1983), a scale developed to rate aspects of parental behavior during free play. These data were collected by observers from videotapes following the free-play sessions. The PCIS has three subscales. These scales are amount, quality, and appropriateness. Eleven parental behaviors--for example, physical involvement, sequencing, and structuring of activities--are subsumed within each of the scale dimensions. This is an average rating across those 11 behaviors for each of the subscales.

In this figure the children have been divided into those receiving systematic instruction and those receiving periodic evaluations, as well as into ambulatory and non-ambulatory groups. The ambulatory group here again includes both sitters and crawlers. The top dotted line, for example, plots the ratings received on the three subscales for the ambulatory children receiving the more intense level of services, systematic instruction.

Although we found the mothers of the non-ambulatory children very adaptive in their responses to these highly immobile and difficult to read children, the mothers receiving the more intense level of services were rated

higher in terms of the appropriateness of their responses. Likewise, the mothers of the ambulatory children who had received the more intense level of services were rated dramatically higher on both the quality and appropriateness of their responses.

While we would not consider the ratings of the periodic evaluation group of mothers low (an average of about 3.5 on quality and a little less on appropriateness), we feel it is important to note that as a group they show lower appropriateness ratings than quality ones. That is not the case for the mothers with a more intense level of services. (We cannot discount the possible influence of self-selection into either group, but it seemed to us that the reason the one group received only periodic evaluation was due to late referral.)

Since this study is still in progress, these results are to be viewed as preliminary ones. However, they may be suggestive of some emerging patterns. The importance of contextual factors on parental responses to their infants was demonstrated. Had we not considered the type of services the family was receiving we would have seen a different picture. As it was, the effect was a differential one -- those mothers receiving continuous, systematic intervention were better able to read their infants behaviors and adapt their behaviors appropriately.

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Table 1
Family Characteristics of Initial Sample of Handicapped Infants

Parental Age				Ethnic-Cultural Background			Family Income Level		
	Range	$\bar{X}$	SD		N	%		N	%
Mothers	21-40	30	4.69	Black	2	14	< 10,000	1	7
Fathers	24-41	33	4.54	White	12	86	10,000-25,000	8	57
							> 25,000	5	36

Level of Parental Education						Parental Occupation				
	<HS	HS	Tech.	College	> College		Homemaker	Unskilled	Skilled	Prof
Mothers	0	1	3	5	5	Mothers	8	0	3	3
Fathers	2	2	0	2	8	Fathers	0	1	4	9

Table 2
Characteristics of Initial Sample of Handicapped Infants

Child Characteristics

Sex		Age		Bayley Scales of Infant Development		
M	F	Range	$\bar{X}$	<28 (est.)	50-75	76-106
9	5	10-12 mos.	11.22	5	2	7

Pregnancy and Delivery

Time of Delivery			Complications		Birth Order	
Term	Premature	Postmature	Yes	No	1st	later
10	2	2	8	6	7	7

Diagnostic Category

Undiagnosed Developmental Delay	3
Down Syndrome	2
Meningitis	2
Cerebral Palsy	2
Dysmophic Syndromes	2
Degenerative Disease	1
Birth Trauma	1
Spina Bifida	1

Table 3

Risk Points Assigned from Neuromotor Examinations of 14 Handicapped Infants Using the Movement Assessment of Infants

	Muscle Tone		Primitive Reflexes		Automatic Reactions		Volitional Movement		Total Risk Score	
	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD
Ambulatory										
Crawlers N=5	4.2	2.77	2.8	1.64	4.8	3.77	3.8	4.44	15.6	9.71
Sitters N=4	8.0	1.63	4.75	2.06	8.75	2.06	9.0	2.58	30.5	7.77
Non-Ambulatory N=5	10.0	0	8.0	1.2	14.6	.55	22.2	2.49	54.8	1.79

Table 4

Proportion of Sessinn Handicapped Infants
Looked at Mother, Toys or Away

	Mother		Toy		Away	
	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD
Ambulatory						
Crawlers N=5	3%	1.18	59%	3.51	37%	3.56
Sitters N=4	10%	8.49	65%	13.14	25%	9.78
Non-ambulatory						
Meningitis N=2	6%	4.95	1%	0	92%	7.78
Others N=3	17%	14.57	39%	36.68	44%	22.81

Figure 1

MODEL OF INFANT READABILITY

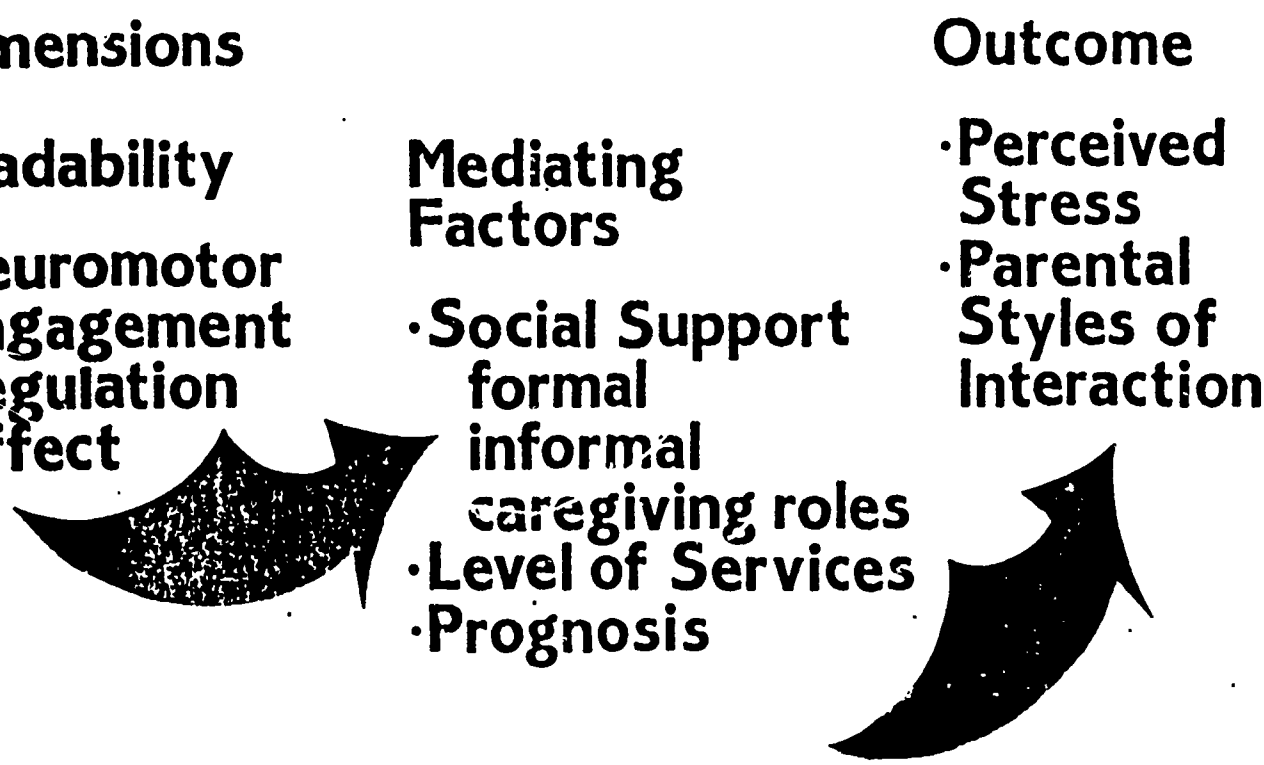
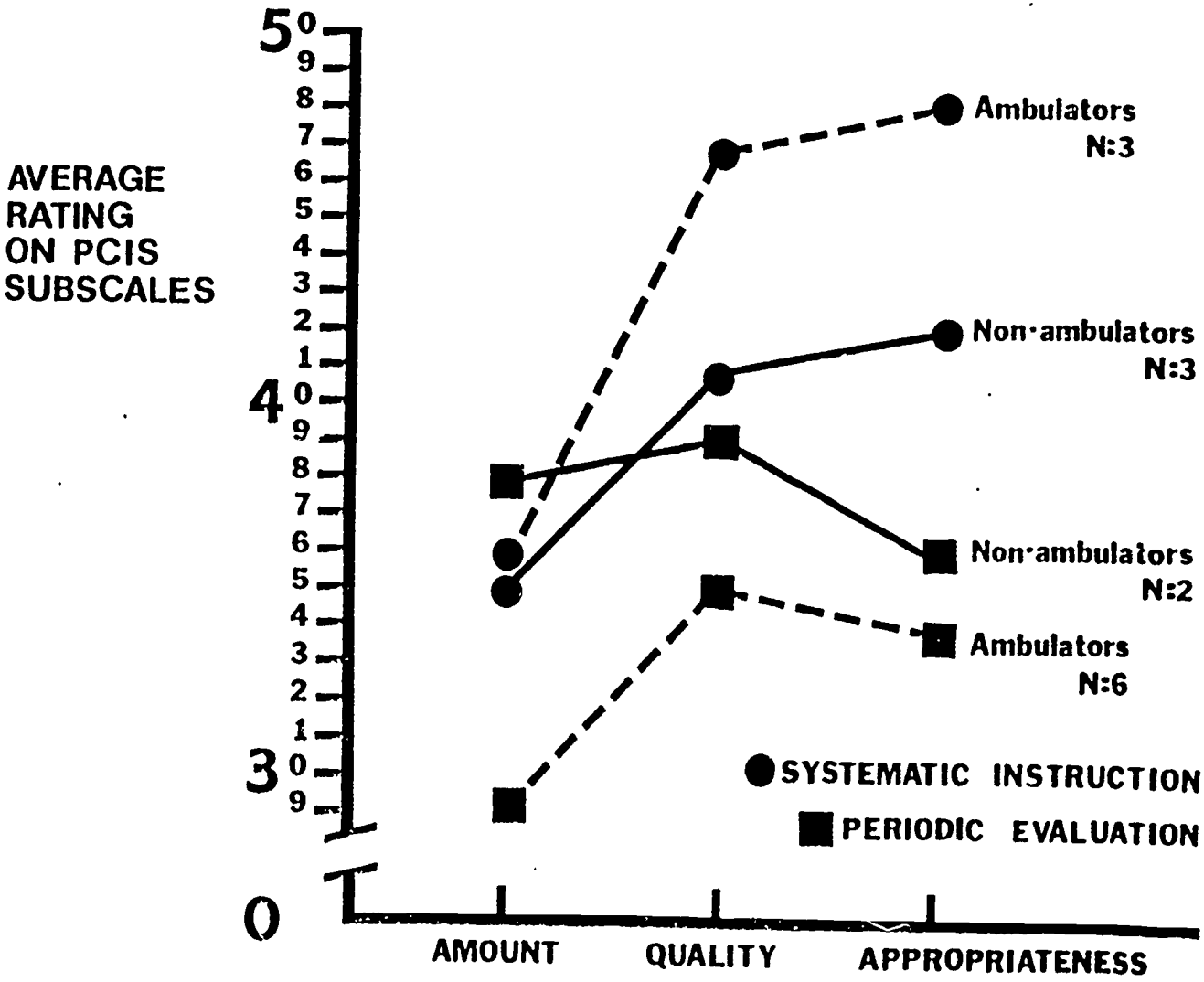


Figure 2


AVERAGE RATING ON PCIS SUBSCALES
5.0
4.0
3.0
0
AMOUNT
QUALITY
APPROPRIATENESS
Ambulators N:3
Non-ambulators N:3
Non-ambulators N:2
Ambulators N:6
SYSTEMATIC INSTRUCTION
PERIODIC EVALUATION

THE EFFECT OF EARLY INTERVENTION ON THE INTERACTION PATTERNS OF CAREGIVERS AND THEIR HANDICAPPED INFANTS

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EARLY INTERVENTION AND CAREGIVER-HANDICAPPED INFANT INTERACTIONS

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An increasing emphasis in interventions with the handicapped child has been placed on the caregiver-child relationship. This emphasis stems in part from reports that handicapped infants often exhibit ambiguous interactive behaviors which are difficult for caregivers to read and interpret. The result may be an ineffective and unsatisfying interaction between mother and child. However, early intervention may have a facilitating effect on these interactions by assisting parents in reading ambiguous infant cues. The purpose of the present study was to examine whether the level of intervention a family received made any difference in the quality or appropriateness of caregiver-child interactions.

Eighteen mother-handicapped infant pairs were videotaped when the infants were between the ages of 10 and 12 months. The average infant age was 11.5 months and 11 infants were males. Mothers were asked to interact with their children as if they had 20 minutes of free time at home. A standard set of toys was available.

All of the mothers and infants in this sample were receiving some type of early intervention. However, intervention approaches within this sample varied along two dimensions: length of intervention and intensity of services. One group of children had been receiving intervention in the home on a regular weekly basis for greater than five months before we evaluated

them. The other group was receiving periodic evaluations from intervention staff or had just begun regular home visits. We termed the former group the systematic intervention group and the latter group the periodic intervention group. The two groups did not differ significantly in terms of infant age, maternal age, and family background. However, infant neuromotor status as determined by the Movement Assessment of Infants did yield significant mean differences between the groups. The children in the systematic intervention group demonstrated a higher neuromotor risk status than the children in the periodic intervention group. This finding is not surprising since the more motorically involved children are likely to have readily apparent problems at birth. Consequently, they receive earlier and more intense intervention services.

Maternal behaviors within the mother-child interaction sessions were examined to determine the amount, the quality, and the appropriateness of maternal behaviors. The Parent-Child Interaction Scale (PCIS) (Farran, Kasari, & Jay, 1983) was used to rate maternal behaviors. Ratings were made by two raters unaware of the type of intervention the children were receiving. Utilizing Generalizability theory, reliability of these ratings was estimated at .89 for Amount, .93 for Quality, and .82 for Appropriateness.

Ratings on the PCIS were then compared for the two groups of children. Results indicated that those caregivers and infants receiving the more systematic level of intervention received

significantly higher ratings in all three areas of involvement (Table I). These results indicate that early intervention may be beneficial to the caregiver-child relationship by assisting parents in reading and interpreting their infant's particular signals.

TABLE I. Characteristics of 18 handicapped infants and their families.

FAMILY CHARACTERISTICS

Maternal Age: 29.9
Hollingshead's 4-Factor Index: 43.75
Average Family Income: $25,000

CHILD CHARACTERISTICS

Age: 11.5 months
Gender: 7 Females, 11 Males
Birth-order: 1.77
Bayley MDI Score: $\underline{M}$ = 64.11, Range = 27-106
Movement Assessment of Infants: $\underline{M}$ = 32.94 risk points, Range = 6 - 56 risk points

Diagnoses:

Down Syndrome: 5
Cerebral Palsy: 4
Dysmorphic Syndrome: 2
Undiagnosed Developmental Delay: 2
Post-Meningitis: 2
Degenerative Disease: 1
Severe Birth Trauma: 1
Spina Bifida: 1