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MATERNAL KNOWLEDGE OF INFANT DEVELOPMENT AND MATERNAL CHARACTERISTICS: LINKS TO QUALITY OF MOTHER-INFANT INTERACTIONS

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MATERNAL KNOWLEDGE OF INFANT DEVELOPMENT AND MATERNAL CHARACTERISTICS: LINKS TO QUALITY OF MOTHER-INFANT INTERACTIONS

By

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ABSTRACT

MATERNAL KNOWLEDGE OF INFANT DEVELOPMENT AND MATERNAL CHARACTERISTICS: LINKS TO QUALITY OF MOTHER-INFANT INTERACTIONS

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The purpose of this study was to examine the relationships between maternal knowledge of infant development and maternal age and education, and the quality of maternal interactions with infants. This study involved a secondary analysis of baseline data collected from urban, low-income mothers recruited for a larger, longitudinal evaluation of early intervention. The present research hypothesized that younger mothers and mothers who had completed fewer years of education would tend to possess less realistic knowledge of infant development and would tend to engage their infants less positively than older mothers with higher educational achievement. Analysis of variance yielded significant differences between younger and older mothers on their knowledge of infant development. Regression analyses did not find maternal characteristics to be predictive for either mother-infant interactions or maternal knowledge of development. Results are discussed, along with implications for providing accurate information about infant and child growth and development for young mothers.

Dedicated to Gladys Wackenhuth, to the memory of William "Ernie" Wackenhuth, and to the memory of three schoolmates whose kindness and courage will not be forgotten: Daniel Knapp, Jennifer Burdick, and Jen Subin.

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Introduction

A tremendous amount of research has been conducted over the past three decades examining the multiple influences on parenting styles and upon mother-infant interactions in the United States (Luster & Okagaki, 1993). Some of the most heavily cited determinants of parenting styles, behaviors, and attitudes include: the educational level of the mother, social support network strength and size (Biringen, 1990; Crockenberg, 1987), quality of home environment (Hannan & Luster, 1991), maternal age (Cauby, Nixon, & Bright, 1991), socioeconomic status (Blackburn, 1986), parental belief systems and attitudes (Okagaki & Divecha, 1993), family stress, knowledge of child development (Stoiber & Houghton, 1993; Vukelich & Kliman, 1985), and infant and child temperament (Power, Gershenhor, & Stafford, 1990; Saudino & Plomin, 1997; Wolk, Zeanah, Garcia Coll, & Carr, 1992).

While much research regarding parenting has been narrow in scope, utilizing simple correlations between individual variables, other work has attempted to investigate the interdependency of these elements within multiply-determined contexts that are subject to change over time (Belsky, 1984; Ford & Lerner, 1992; Hann, 1989). If human development is conceptualized as an ecological, complex, dynamic interdependency of environmental and interpersonal factors that inform, support, and affect parent-child interaction (Bronfenbrenner, 1979), and if this conceptualization bolsters the most effective intervention strategies to improve conditions for parents and their children, then a systems approach to analyzing these patterns is warranted.

Of particular concern to researchers have been the ways in which parents cope with multiple stresses in child-rearing. Commonly cited sources of risk for maladaptive parenting include low income, low level of education, lack of social and emotional support (Crockenberg,1987; Zero-To-Three, 1999), inadequate knowledge of child development (Luster & Rhoades, 1989), and rigid or authoritarian parenting attitudes (Milburn, 1997). Adolescent mothers have been repeatedly studied precisely because they are often compromised by many of these factors simultaneously. Additional correlates with adolescent pregnancy that may impact coping abilities include self-devaluation, emotional immaturity, low ego development, basic inexperience with child rearing, inappropriate expectations of children, and low self-esteem (Casuby, Nixon, & Bright, 1991).

Adolescent mothers often tend to not complete high school, to be single, under- or unemployed, and to provide home environments that are less stimulating than comparison groups of older mothers (Karraker & Evans, 1996; Luster & Mittelstaedt, 1993; Luster & Rhoades, 1989). Milburn (1997) cites studies comparing adolescent mothers with older mothers that concluded that the age of the mother at the time of the infant's birth is a critical factor for the mother's and infant's adjustment. Most researchers agree that it is not age itself that is troublesome, but rather those factors typically associated with young age, including level of education, employment, social and emotional immaturity. *When* an adolescent has a child may play as important a role as *how* she enriches the infant's environment. Across several socioeconomic and social groups, researchers have discovered that adolescent mothers spend less time engaging in positive verbal interactions with their infants (Cooley & Unger, 1991; Levine, Garcia Coll, & Oh, 1985;

cited in Milburn, 1997). Two critical factors placing infants of adolescent mothers at risk include less realistic developmental expectations and rigid maternal childrearing attitudes (Brooks-Gunn & Furstenberg, 1986; Field, Widmayer, Stringer, & Ignatoff, 1980; Fulton, Murphy, & Anderson, 1991; Haskett, Johnson, & Miller, 1994; Kurtz & Derevensky, 1994; Reis, 1989; as cited in Milburn, 1997, p.11).

Single, young, low-income parents are the least likely to feel prepared for raising a child, according to a 1991 national poll (Zero-To-Three, 1999). When new mothers seek a better understanding regarding day-to-day infant care, they tend to consult family members, friends, and neighbors. Health care providers, especially pediatricians, are the most frequently consulted sources of developmental information beyond the realm of family and friends (Collins & Chacko, 1993). Nearly half of all parents polled said they also follow newspaper and magazine articles, as well as television news reports, related to early child development. McCann (1997) however, points out that while these non-professional sources of information may supply valuable emotional or psychological benefits to new mothers, the specific health-related information passed on may not always be correct.

Emotional and physical care-giving skills are vitally important contributors to maternal confidence and consistency, but they must be established upon a solid understanding of the physical, psychological, and social capabilities and needs of the infant (Boger & Smith, 1986). Unrealistic expectations of infant and child behavior and adaptation to the caregiving environment may impede positive mother-infant communication, undermine or exaggerate maternal confidence and self-esteem, and/or contribute to cumulative developmental risk factors already present.

The present study was designed to examine the correlations between maternal age, education, and knowledge of development, which a number of studies have found to significantly affect mother-infant interactions. It sets out to replicate contemporary research findings regarding the ways in which knowledge of infant and child development contribute to the quality of the emotional settings infants encounter.

Problem statement

This study examines the associations between maternal characteristics (e.g., education level, age), knowledge of infant development, and the quality of mother-infant interaction.

Conceptual and operational definitions

Mother-Infant Interaction, the dependent variable in this study, was conceptually defined as the quality of maternal physical, emotional, and verbal warmth and responsivity to infant cues. It includes individually appropriate maternal responses to infant distress as well as positive, mother-directed social and emotional enriching interactions between mother and infant. This definition of mother-infant interaction has been operationalized as six subscale scores on the Teaching Scale of the Nursing Child Assessment Satellite Training (NCAST). Specifically, these subscales include: Sensitivity to Cues, Response to Distress, Social-Emotional Growth Fostering, Cognitive Growth-Fostering (parenting subscales), and Responsiveness to Parent and Child Clarity of Cues (infant subscales). The parent subscales summary score has an excellent internal consistency and a high test-retest reliability over a long term time interval (Sumner &

Speitz, 1994). The two infant subscales were included in this study in order to give a more complete picture of the interactions, despite their poorer predictive reliability (Sumner & Speitz, 1994).

Knowledge of Infant Development, the first independent variable, was defined as a mother's familiarity with infant developmental norms and milestones, general principles and processes of development, maternal responsibilities and strategies with regard to child-rearing, and health and safety concerns attendant on caring for young children (Milburn, 1997). Operationally, this variable was measured by summing the maternal scores on the shortened version of the KIDI (MacPhee, 1981), with correct items receiving a "1" and incorrect or "not sure" responses receiving a "0". Therefore, the closer the mean score to one for each question, the greater the amount of knowledge indicated, with a total possible cumulative score of 14.

Maternal Characteristics, the second independent variable, were defined specifically as maternal age and educational level completed. This information was gathered through initial intake interviews and surveys conducted by the Jackson Community Action Agency.

Summary

This study will examine the relationships between the quality of mother-infant interactions and maternal age, education level, and knowledge of infant development. It will then investigate the relevant literature, conduct the proper statistical analyses, and interpret the results, closing with considerations for future research.

Conceptual Framework

Developmental Contextualism

According to Hann (1989), a systems model of mother-infant interactions must fundamentally address the interrelated systems of both direct and indirect environmental levels impacting this dyad. While any single level of the system may influence mother-infant transactions, consideration must be given to potential direct (e.g. infant or maternal characteristics) and indirect (e.g. the social context of the family) influences in relation to one another. Each of these levels can act as a source of support or stress for the mother and infant, and the combination of these influences may significantly encourage or discourage positive mother-infant interactions.

In order to interpret the findings of the present study in a systems context, it is first necessary to define Lerner's (Lerner, 1991, 1995; Ford & Lerner, 1992) model of developmental contextualism, explore its assumptions and its relationship to the problem, and finally to clarify its tenets in regard to issues impacting mother-infant.

Developmental contextualism, which has guided the thinking of the investigator, begins with the simple assertions that the most basic process of human development is a relational one and that it is the nature of living beings to change over time (Lerner, 1991). This theory assumes constant change at all levels of analysis and that each level is embedded within all other levels so that changes in one level promote changes in all other levels (Lerner, 1984). While many other theories of human development emphasize a degree of relative constancy in specific dimensions of individuality (e.g., personality or temperament), developmental contextualism assumes that there exists no complete

uniformity or constancy. Human beings are considered self-organizing in that they selectively engage specific contexts from among their potential environments; they process their world in unique ways, so that the same environmental conditions may have different influences from one person to another or for the same person at different points in time; and they influence and stimulate changes in one another through their patterns of circular interactions (Ford & Lerner, 1992).

Developmental contextualism conceives of an individual as a dynamic unit, composed of complex biological and psychological processes embedded and fused in interaction with multi-leveled environments. Examining parents as persons-in-contexts means that environmental boundaries define currently available developmental pathways (Ford & Lerner, 1992). For example, mothers who have not completed high school often find their opportunities for higher-level and higher-income employment severely curtailed, which may modify their emotional, physical, and psychological well-being in regard to providing adequate food, shelter, and stimulation for their children. Thus, alterations in current states will in part be constrained by the hierarchy of options open to mothers.

Two theories that approximate this level of interaction and change are Bronfenbrenner's (1979) human ecological model and Belsky's (1984) parenting process model. Bronfenbrenner (1979) emphasizes the processes through which the growing individual comes to more accurately understand her or his ecological environment and to engage in activities that sustain or restructure that environment to accommodate growth. Human ecological theory stresses that changes in one member of a dyad (mother-infant, for example) influence reciprocal changes in the other member (Bronfenbrenner, 1979).

Belsky's (1984) parenting process model presumes that parenting is directly influenced by the caregiver's characteristics, the child's characteristics, and by the broader social context in which the parent-child relationship is embedded. Both models provide useful points of departure for research involving mother-infant interaction in that they take into account interpersonal attributes, developmental change over time, and contextually-sensitive measurements of the caregiving environment.

Adequate descriptions of individual development, however, must include characteristics that include the biological, psychological, interpersonal, societal, cultural, ecological, and historical components of the person's changing developmental niche (Lerner, 1995). Lerner's (1984, 1991) developmental contextual model of person-context interactions illustrates some of the ways these characteristics and levels of influence modulate one another (Figure 1). This model portrays the complex nature of reciprocal relationships between children and parents interacting over time, as well as the multiple networks (i.e., schools, peers, family, work) relevant to the development of relationships between these central individuals.

Figure 1 further illustrates broader social contexts, including community, societal, and cultural norms, expectations, events, and opportunities are situated around the day-to-day relationships between parent and child as they indirectly guide shared interpersonal experiences over developmental time. Lerner (1984) suggests that the development of each family member is in part both a product and a producer of the development of the other.

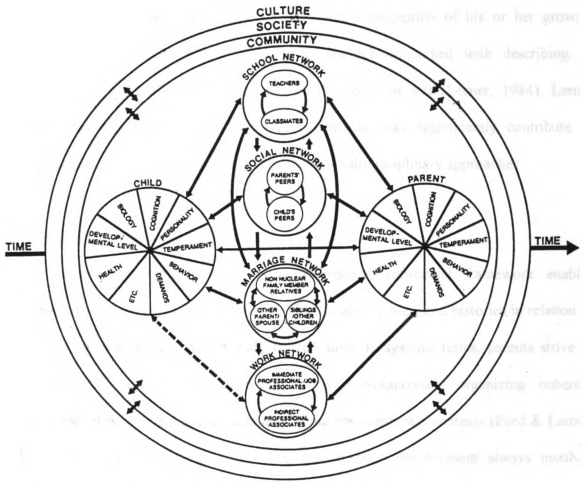

Figure 1. A developmental contextual model of person-context interaction. Lerner, R. (1991). Changing organism-context relations as the basic process of development. A developmental contextual perspective. Developmental Psychology, 27, 30. Copyright 1991 by the American Psychological Association. Reprinted by permission.

Another important aspect of developmental contextualism is the general concept of plasticity. Plasticity implies that developing individuals actively shape and select their contexts in a large number of distinct fashions, given their unique combination of genetic potential and the diffuse environmental characteristics and interactions they encounter (Ford & Lerner, 1992). Therefore, an individual's perception of his or her growth-promoting activities should be primary to research concerned with describing or facilitating the development of the individual's sense of self (Lerner, 1984). Lerner (1984) has argued that this potential for plasticity may significantly contribute to parenting intervention through carefully directed multidisciplinary approaches.

Theory and its relation to the problem

Situating parenting within a developmental contextual framework enables researchers to conceptualize parental beliefs, attitudes, values, and histories in relation to the ways in which they interact with their children. In systems terms, parents strive to increase their childrearing competencies by simultaneously organizing coherent interpersonal boundaries and navigating shifting environmental contexts (Ford & Lerner, 1992). Parkinson & Harvey (1987) note that because development always involves organism-environment interaction, some aspects of development and behavior may be more easily influenced by environmental conditions than others. This susceptibility tends to be responsive to environmental changes as well, indicating that interventions targeted towards supporting and improving dyadic behavior patterns must take the evolving parent-child-environment into account.

Specific applications

Many of the implications of a developmental contextual framework have already been demonstrated by research on maternal self-efficacy and beliefs as mediators of parenting abilities. Teti and Gelfand (1991), in their sample of 86 clinically depressed and non-depressed mothers, found that maternal self-efficacy plays an important role in determining interactions with their infants. They found that the influences of depression, social support, and maternal perceptions of infant temperament were largely indirectly mediated by mothers' feelings of efficacy in the maternal role.

Okagaki and Divecha (1993) demonstrated that environmental contexts shape parental beliefs by "(a) providing access to information, (b) shaping parents' values and ideas about how the world works . . . and (c) affecting the perceptions parents have of their own children" (p.36). Citing results from an earlier study by Luster & Rhoades (1989), the authors noted that mothers who provided the most supportive care for their infants believed that infants need the freedom to explore their environments, that parenting does influence their child's development, that parents should be responsive to infants' cues, and that even young children need adequate verbal stimulation (Okagaki & Divecha, 1993, pp.56-57). Further, the researchers identified three processes mediating parental behaviors: the modification of beliefs with new child development information, the reciprocal function of parental attitudes toward their children and feelings of being psychologically drained or rewarded in non-parenting roles, and that parental values are organized by the functional roles they play (Okagaki & Divecha, 1993).

Summary of the model

The purpose of this study was to examine the relationships between maternal knowledge of infant development and maternal characteristics, and the quality of her interactions with her infant. The present research hypothesized that adolescent mothers and mothers who had completed fewer years of formal schooling would each tend to possess less realistic knowledge of infant development and would tend to engage their infants less positively than older mothers who had completed more years of formal schooling. Evidence for the existence of these relationships is supported by a review of the pertinent research literature.

Literature Review

Introduction

Parenting is influenced by life stresses. The ways in which mothers and fathers interact with, nurture, discipline, support, perceive and control the behavior of their children is affected by the contextual stressors parents themselves experience (Lerner, 1984). As Belsky (1984) noted, the psychological characteristics of caregivers, the infant or child's characteristics, and the contextual environment in which they interact will all exert complex influences on each other. Belsky (1984) regards maternal psychological resources as the most influential determinant of parenting, stressing its direct impact upon parental functioning as well as its indirect effects on the recruitment of additional contextual support.

Women raising children in impoverished environments face additional stressors that impact how they stimulate and nurture their infants. Low income, unemployment,

malnutrition, poor housing opportunities, and lack of health care are only a few of the mechanisms that may account for the detrimental effects of poverty on healthy development. Among these factors, however, the "low levels of stimulation and support which characterize the home environments for poor children are thought to play the largest role in developmental outcome" (Watson et al., 1996, p.420). According to researchers, low maternal IQ, limited education, and young maternal age often accompany poverty and tend to exacerbate its effects. In a large study of poor and non-poor families with infants receiving no intervention, investigators documented generally lower HOME scores in low SES or impoverished families, with the finding that scores for all but one of the HOME subscales were significantly lower for the chronically poor sample (Watson et al., 1996). They concluded that poverty was influencing many components of the caregiving environment, including the ways in which the physical environment was structured, academic and language stimulation, nurturing parental behaviors, and parental responsivity, all of which were lower in the chronically poor group. Similarly, Hannan & Luster (1991), in their study of 602 mothers with infants between 12 and 23 months of age, concluded that although most parents cope adequately when exposed to only one or two risk factors, fewer could provide high-quality care when they must face several stressful obstacles simultaneously.

Given the multiply-determined contexts in which childrearing occurs, it is important to study the ways maternal characteristics buffer and facilitate interactions with their infants. The literature review that follows will discuss previous research on the relationships between maternal knowledge of infant development and mother-infant

interactions; and maternal age and education level as variables impacting mother-infant interactions and maternal knowledge of infant development.

Maternal Knowledge of Infant Development

> Infants are highly involved in determining the course of their own development, and infants' and parents' sensitivity to each other's signals can influence positively the emerging transactional relationship.
> (Boger & Smith, 1986, p.107)

Mother-Infant Interactions

Maternal knowledge of infant development, in both the normative sense and with regard to the cues and behaviors of her own infant, contributes dramatically to the ways in which she formulates expectations of her infant, revises her parenting attitudes, perceives her infant's communication, engages in nurturing interactions, and experiences feelings of self-efficacy and competence. In one of the most important and heavily cited studies of knowledge of development in parenting, Stevens (1984), working with 243 mothers and their 15 to 30 month old infants, found that maternal knowledge of child development was positively related to their skill in designing a supportive learning environment and in their ability to interact in ways that stimulated development. He also cited previous experimental studies (Gordon & Guinaugh, 1974; Grantham-McGregor & Desai, 1975) indicating that parenting education programs produced benefits in both parents' knowledge and in their skills in nurturing their infants (Stevens, 1984). Conrad and colleagues (1992) found in their study that the interactions between maternal confidence and knowledge of child development and parenting significantly predicted the quality of mother-toddler interactions. Since many mothers feel poorly prepared or

informed for the task of childrearing (Griffore, 1980; Vukelich & Kliman, 1985; Zero-To-Three, 1999), it is crucial to examine the role developmental information plays in mother-infant interactions, how the home environment is structured, and how that information is incorporated into parenting styles, values, and expectations.

Belsky (1984) cited research revealing that during infancy, "cognitive-motivational competence and healthy socioemotional development are promoted by attentive, warm, stimulating, responsive, and nonrestrictive caregiving" (p.85). Mothers' interactions with their infants reflect their beliefs about childrearing, and these beliefs are influenced by previous childcare experience, education level, and knowledge of child development (Broussard, 1979, cited in Jordan, 1985). Smeriglio and Parks (1983) divide this developmental knowledge into awareness of developmental milestones, awareness of specific caregiving techniques, and perceptions of relationships between parenting and developmental outcome (cited in Jordan, 1985).

Boger and Smith (1986) note that a basic knowledge of infant behavior is predictive of parenting success and positive parent/infant experiences, enabling parents to understand the physical, psychological, and social capabilities of the newborn, and that this knowledge bolsters parental confidence and consistency. Del Carmen and colleagues (1993), examining the attachment research, point out that variations in feelings of security evolve as a function of individual differences in infant characteristics that allow clear signaling behavior and maternal responsiveness to those signals. In their study of 54 mothers and their firstborn infants, the authors concluded that the infant's ability to elicit distress cues, such as crying and fussing, were predictive in prompting maternal responsivity to those cues (Del Carmen et al., 1993). Thus, stimulating, responsive,

warm, attentive caregiving is influenced by maternal understanding of individual infant behavior and contextual clues.

Expectations, critical to mother-infant interactions, are affected by maternal age, occupation, and education level, as well as knowledge of infant development (Vukelich & Kliman, 1985). Hall (1980) notes that a mother's personal assessment and interpretations of her infant's behavior are affected by the infant's personality, her expectations, and the attachment relationship that has formed between them (cited in Jordan, 1985). This theory has been borne out by research. Stoiber and Houghton (1993) found, in their study of 40 adolescent mothers and their 4 to 22 month old infants, that the mother's self-reports of expectations for their own and their infant's behavior accounted for a significant proportion of the variance in objective ratings of their infant's sensorimotor and reactive behavioral domains. Mothers in their study who reported more positive, more realistic, and more mature expectations about parenting had infants who displayed more adaptive and effective coping behavior. Other researchers have uncovered evidence that parents' inaccurate beliefs or over-estimations of their children's abilities tend to undermine child performance (Miller, 1988; Miller, Manhal, & Mee, 1991; Stoiber, 1992; cited in Stoiber & Houghton, 1993).

Maternal observations and self-reports of infant behavior and temperament may serve as windows on mothers' expectations and biases (Cardone & Gilkerson, 1990). St. James-Roberts and Wolke (1984) view these maternal ratings as "social perceptions" incorporating maternal as well as child factors, which provide information about maternal thought processes, circumstance, and the mother-infant relationship.

Maternal Age and Education Level

Most studies comparing adolescent mothers with older mothers have found significant differences in maternal-infant interactions as well as differences in infant and child development knowledge, most of which favor older mothers (Baranowski, Schilmoeller, & Higgins, 1990; Collins & Chacko, 1993; Luster & Mittelstaedt, 1993; Stoiber & Houghton, 1993). Maternal education levels follow a similar pattern in these studies, as most adolescent mothers have not and generally tend not to complete high school, often because programs tailored to meet the needs of adolescent mothers and their infants are not widely available (Collins & Chacko, 1993).

Caregiving interactions tend to be more affectionate and nurturing, less controlling, and more comforting between older mothers and their infants than between adolescent and younger mothers (Boger et al., 1986). Several studies suggest that adolescent mothers possess weaker nurturing skills when compared to older mothers (Hardy, 1978; McArnarney, 1986, 1989; Phipps-Yonas, 1980; Yoos, 1987; Zuckerman, 1984; cited in Collins & Chacko, 1993). Boger and colleagues (1986) found in their intervention program with 48 first time mothers that older mothers vocalized more, were more spontaneous, displayed more positive emotional responses toward their infants, avoided restrictions, and offered their infants more variety and depth of stimulation than did younger mothers. Researchers have demonstrated that adolescent mothers generally behave less empathetically, with less acceptance and less cooperation with their infants than older mothers (Baranowski, 1990; Fox, 1987; Gutelius, 1977; cited in Collins & Chacko, 1993). Thus, the emotional environment of the infant is intimately impacted by maternal responsivity and warmth.

Adolescent mothers also tend to be less emotionally and verbally responsive to their infants, and more restrictive and punitive, than older mothers (Luster & Mittelstaedt, 1993; Luster & Rhoades, 1989; Reis, 1988). Additionally, Baranowski, Schilmoeller, and Higgins (1990) found that teenage mothers had significantly lower mean scores on empathy toward children, although they attribute this to "a broader profile of less empathy toward people of all ages among adolescents as compared to adults" (p.788).

Social support and parent education curriculums for adolescent mothers, however, have demonstrated positive gains in the quality of mother-infant interactions. In Milburn's (1997) longitudinal study of 175 adolescent mothers, she cites evidence that as emotional support increased, negative parenting attitudes decreased, although this social support did not necessarily increase knowledge of infant development. Ward and colleagues (1988), in an unpublished study, found that more knowledgeable teen mothers were more sensitive and responsive in their infant interactions than other teen mothers when their infants were four months old (cited in Luster & Mittelstaedt, 1993). And Causby, Nixon, and Bright (1991) indicated that adolescent mothers involved in a specialized school parent education curriculum interacted more effectively with their infants than mothers involved in a traditional school curriculum. Thus, expanding social supports and educational interventions for adolescent mothers may provide ameliorative effects on their interactions with their infants.

Mothers who are more knowledgeable about child development generally provide more emotionally supportive environments for their infants, and younger mothers tend to be less knowledgeable and less supportive than older mothers (Luster & Mittelstaedt, 1993). Reis' (1988) secondary data analysis of 652 mothers between the ages of 15 and

25 found that young adolescent mothers were less knowledgeable about child development, more punitive in their childrearing attitudes, and more depressed than older mothers. The adolescent mothers in Karraker and Evans (1996) study were less knowledgeable about normal infant development and less accurate in predicting their own infants' behaviors than older adult mothers. This finding supports Sommer and colleagues' (1993) hypothesis that some adolescent mothers are less cognitively prepared for parenting than are older mothers (cited in Karakker & Evans, 1996). Among teen mothers, Johnson's (1990) unpublished study reported that more knowledgeable adolescent teen mothers outperformed less knowledgeable teen mothers on a number of parenting dimensions during a teaching task (cited in Luster & Mittelstaedt, 1993). In Vukelich and Kliman's (1985) small sample of 45 mothers, all had some inappropriate developmental expectations for infants, but the teenage mothers had considerably less knowledge of infant development than the older mothers. Conrad and colleagues (1992) found that the older mothers in their sample of 50 white, middle class mothers, were significantly more confident, whereas mothers with more education and higher incomes were more knowledgeable about child development and parenting and had more positive interactions with their toddlers. In this study, the researchers found that maternal confidence and knowledge of child development were significantly related to one another but neither, alone, was predictive of the quality of the mother-toddler interaction. Thus, education and age play important but not exclusive roles in shaping nurturing, caregiving interactions between mothers and infants.

Summary

The research literature has clearly provided important distinctions in the caregiving styles between younger and older mothers, as well as those with less educational attainment compared to those with more education. However, in this consideration of caregiving trends, one must keep in mind that adolescent mothers as a group comprise a heterogeneous mixture of knowledge, attitudes, experiences, and beliefs, and that "not all adolescent mothers are unprepared or ill equipped for their parenting responsibilities" (Reis, 1988, p.148). Small and Luster (1990) stress that many of the factors that put teens at risk for becoming adolescent parents also put them at risk for performing poorly in parenting roles (cited in Luster & Mittelstaedt, 1993). Equally important is the fact that the literature on teen motherhood remains limited in scope due to the relatively few longitudinal studies, small sample sizes, and failure to control for confounding variables in many studies (Luster & Mittelstaedt, 1993). Research must be sensitive to these interrelated factors impinging upon parenting practices for young and older mothers.

The present study is a descriptive correlational examination of the ways in which levels of knowledge about infant development and maternal age and education are related to the quality of mother-infant interactions. It is expected that findings here will replicate the previously cited research literature emphasizing the centrality of maternal perceptions, cue recognition, and maternal responsivity to individual infant differences in providing stimulating, growth-promoting mother-infant interactions.

Research Questions/Hypotheses

This study examined the relationships among various elements of mother-infant interactions, including the quality of maternal verbal and emotional responsivity to her infant, maternal understanding of developmental milestones and general knowledge of infant growth, as well as maternal age and education level. Therefore, several research questions were asked and more specific research hypotheses were tested. The null hypothesis for each question is assumed and will be discussed in the analyses section.

1. *Maternal Age Research Questions*: Do older and younger mothers differ in the quality of interactions with their infants? Do older and younger mothers differ in their knowledge of infant development?

Research Hypotheses: 1(a) Older mothers will have higher quality interactions with their infants than younger mothers. 1(b) Older mothers will have higher levels of knowledge of infant development than younger mothers.

2. *Maternal Education Level Research Questions*: Do more educated mothers differ from less educated mothers in the quality of their interactions? Do more educated mothers differ from less educated mothers in their knowledge of infant development?

Research Hypotheses: 2(a) Mothers with higher levels of educational achievement will have higher quality interactions with their infants than mothers with lower levels of education. 2(b) More educated mothers will have higher levels of knowledge about infant development than less educated mothers.

3. *Knowledge of Infant Development Research Question*: Is there a relationship between knowledge of infant development and the quality of mother-infant interactions?

Research Hypothesis: 3. There is a relationship between knowledge of infant development and the quality of mother-infant interactions.

4. *Mother-Infant Interaction Research Question*: To what extent can the variance in mother-infant interactions be explained by maternal age, maternal education level, and knowledge of infant development?

Research Hypothesis: 4. The quality of maternal-infant interactions is related to maternal age, maternal education level, and maternal knowledge of infant development.

5. *Additional Knowledge Research Question*: To what extent can the variance in maternal knowledge of infant development be explained by maternal age, maternal education level, and the quality of mother-infant interactions?

Research Hypothesis: 5. The level of maternal knowledge of infant development is related to maternal age, maternal education level, and the quality of mother-infant interactions.

Decision Rule: A decision rule with a chance probability of $p \leq .05$ will be used.

Methods

Research design

This study is a descriptive, correlational investigation of the relationships between maternal knowledge of infant development, maternal age and educational characteristics, and mother-infant interaction.

Data for this study are taken from the local research component of a national longitudinal evaluation of Early Head Start (Grant Number 90YF0010). This local research project, entitled "Pathways Project: Research into Directions for Family Health and Service Use," begun in May 1996 and continuing through April 2001, is headed by Dr. Rachel Schiffman, the principal investigator, and Dr. Cynthia Gibbons, co-principal investigator. Data collection, analysis, and synthesis for the local and national evaluation project is augmented by a multidisciplinary faculty research team at Michigan State University via subcontract from Mathematica Policy Research, Inc. (MPR). Funding for local research components is provided by a grant from the Administration for Children, Youth and Families, and by a contract with the Region II Community Action Agency in Jackson, Michigan.

Sampling procedures

The sample for this secondary data analysis incorporates families eligible for the Early Head Start Program. The research sample included those families who have had: (1) a child born between 9/1/95 and 6/30/97 who is less than 12 months old, (2) who had not participated for 3 months or longer in the Comprehensive Child Development Program in the past 5 years, (3) who had not participated for 3 months or longer in a Parent-Child Center, Head Start, or a similar program in the past year, and (4) who met federal definitions of families who fall below the 100 percent poverty line. Those sample families randomized into participant groups by Mathematica received services from Early Head Start while the other families in the comparison group were encouraged to access services offered by the community at large. Eligible families were recruited

through a local family service agency. For the purpose of this study, no attempt to compare or contrast these groups drawn from the same population will be made. This study will only examine the data collection done at the time of the families' enrollment and the initial home visit, and there is no way for the present investigator to compare or contrast the scores between the two randomized groups.

Consent was obtained from all participating families at baseline data collection. Permission to use Early Head Start Family Development Program data was granted by the University Committee on Research Involving Human Subjects (UCRIHS), Michigan State University (see Appendix). The present investigator has had no contact whatsoever with any of the subjects, nor is there any way for the investigator to identify any of the subjects from whom data was collected.

Subjects

The 112 mothers who were included in the present study ranged in age from 15 to 38 years old (mean age was 22.5 years old). The sample ethnicity was fairly homogeneous, composed mostly of Caucasian (76%) and African American (13%) mothers, with the remaining 11 percent of the mothers of Hispanic, Korean, Vietnamese, American Indian, Mexican, and Biracial descent. All mothers lived in homes with incomes below the national poverty line. Sixty five percent of the mothers were single, nineteen percent were married, and sixteen percent were either separated (4%), divorced (11%), or widowed (1%). Education varied greatly: Five percent of mothers had less than a 5th grade education, thirteen percent completed the 9th grade, fourteen percent completed 10th grade, eleven percent completed the 11th grade, and two percent

completed the 12th grade without receiving a diploma. Thirty-one percent of the mothers sampled graduated from high school, twenty-three percent attended some college courses, and one percent had earned an Associate's degree.

Instrumentation

The NCAST Teaching scale is a 73-item dichotomous observational scale used to assess the quality of mother-infant interaction during teaching interactions (Barnard, 1978; Sumner & Speitz, 1994). In this study, mother-infant interaction has been measured using the six subscales scores on the Teaching Scale of the Nursing Child Assessment Satellite Training (NCAST). Specifically, these subscales include: Sensitivity to Cues, consisting of 11 items (with a Cronbach's alpha of .52), Response to Distress, 11 items (.80), Social-Emotional Growth Fostering, 11 items (.58), and Cognitive Growth-Fostering, 17 items (.78), Child Clarity of Cues (.50), and Child Responsiveness to Parent (.78). Thus, the total parent reliablity score is .87, the total child score is .81, and the overall total score is .87. The parent summary score has an excellent internal consistency and a high test-retest reliability. Clinicians are trained to ensure a reliability of .85 or better, while researchers must attain an even higher reliability of .92 over a long time interval; data collectors undergo considerable training to ensure this reliability (Sumner & Speitz, 1994). The Teaching NCAST is regarded as a viable and respected measurement instrument with mother-infant dyads, and has proven useful in screening for dysfunctional interactions between high-risk infants and their mothers, as well (Farel et al., 1991).

The Knowledge of Infant Development Inventory (KIDI) interview instrument was created by MacPhee (1981) to assess an individual's familiarity with infant developmental norms and milestones across physical, social, cognitive, and language domains; general principles and processes of development; parental responsibilities and strategies with regard to child-rearing; and health and safety concerns (Milburn, 1997). The KIDI consists of 75 items, 48 of which use an "Agree/Disagree/Not Sure" format and 20 of which use an "Agree/Younger/Older/Not Sure" format. The remaining seven items utilize a multiple-choice/Not Sure format. Two summary variables, "attempted" and "accuracy," are summed from the questionnaire answers. "Attempted" items originate from the Not Sure option, indicating an individual's confidence in her/his knowledge, while "accuracy" items are the tallied percent of correct answers. The KIDI was standardized using data from three sources: pediatricians, undergraduate child psychology students, and mothers (MacPhee, 1981). Validity was obtained from a variety of subsequent studies (Milburn, 1997). Conrad et al. (1992) found a Cronbach's alpha of .68 in their study of 50 mothers-infant dyads, and MacPhee (1981) reported a test-retest reliability of .92 for total score over a 2-week interval.

A shortened version of the KIDI was chosen for use in the Early Head Start Family Development Project. It has 14 questions which assess developmental milestones across four domains (7 items), individual differences (2 items), parenting skills (3 items), and health and safety issues (2 items). A reliability analysis for this shortened KIDI scale in the present study was performed, and a Cronbach's alpha of .44 was found for the scale.

Maternal age and educational level was ascertained through initial baseline intake interviews conducted by the Jackson Community Action Agency.

Data collection

Data for mother-infant observations, surveys, and some interview components were collected during home visits. During the home visit a trained data collector observed the infant and mother interacting in a teaching episode and asked questions. While data collection for the EHSFDP included three to five observations, surveys, and interviews of parents and children in the home setting over five time periods (enrollment, 6, 15, 24, and 36 months of child's age), this secondary analysis utilized only the information, interviews, and observations collected at the time of baseline data collection. These specific data were extracted by the MSU research team and given to the investigator following approval by both the University Committee for Research Involving Human Subjects-- M.S.U (see Appendix) and the Principal Investigator.

Data Analysis

The sample of 112 mothers for the present analysis was extracted from the larger EHS sample data file of 182 mothers. Thirteen cases were deleted due to missing values for the KIDI and NCAST Teaching scale scores, 45 cases were dropped due to missing values for maternal age, and 12 cases were dropped due to missing information regarding maternal education level.

For the purposes of statistical analysis, maternal age was divided into mothers 21 years of age or younger (52 percent of the sample), and into mothers 22 years and older

(48 percent). The research literature supports this categorization given the broader, more inclusive nature of defining adolescent motherhood as a representational range of chronological ages and socio-emotional maturity, instead of a simplified construct of "teenage" motherhood as ending at 20 chronological years of age.

Results of hypotheses

Hypothesis 1

To test hypothesis 1a that younger mothers differed significantly from younger mothers in the quality of their infant interactions, a one-way ANOVA was performed for age as the categorical independent variable (Younger/Older Mothers) and total score on the NCAST Teaching measure as the dependent variable. The mean NCAST Teaching score for younger mothers (mean = 45.7, SD = 11.3) did not differ significantly from older mothers (mean = 48.7, SD = 10.7), although it was slightly higher for older mothers. The total mean score for the NCAST Teaching scale was 47.20 with a standard deviation of 11.08. The results for maternal age failed to prove statistically significant (Table 1), so the null hypothesis was not rejected, and no differences were found between older and younger mothers in infant interactions.

Table 1

One-Way ANOVA for Hypothesis 1a

MTOTAL x AGENEW	Sum of Squares	df	F	Significance
Between Groups	263.931	1	2.170	.144
Within Groups	13380.345	110		

Hypothesis 1b was similarly tested to determine if older mothers scored higher on the KIDI measure than younger mothers. A one-way ANOVA was performed with categorized ages (independent) and total score on the KIDI scale (dependent) variables. The mean total KIDI score was slightly higher for older mothers (mean = 10.7, SD = 1.75) than younger mothers (mean 9.65, SD = 2.14), although not significantly so. The total mean score on the KIDI was 10.17, with a standard deviation of 2.02. The F ratio and its significance are presented in Table 2. The null hypothesis was rejected. Thus, older mothers were found to have higher scores on their knowledge of infant development than younger mothers.

Table 2

One-Way ANOVA for Hypothesis 1b

KIDITOT x AGENEW	Sum of Squares	df	F	Significance
Between Groups	32.955	1	8.560	.004*
Within Groups	423.474	110		

* $p < .01$

Hypothesis 2

One-way ANOVAs were run to determine if more educated mothers differed in the quality of their infant interactions (Hypothesis 2a) and in their knowledge of infant development (Hypothesis 2b) from less educated mothers. The means for total NCAST Teaching scale scores were slightly higher for more educated mothers (mean = 48.8, SD = 9.73) than for mothers who had not graduated from high school (mean = 45.1, SD 12.35), although not statistically significant. The total mean score on the NCAST

Teaching scale was 47.20, with a standard deviation of 11.08. For Hypothesis 2a, total score on the NCAST Teaching scale (dependent variable) and categorized maternal education level (independent variable) had an F ratio of 3.196 and a significance level of .077, *approaching* statistical significance ($p < .05$) requirements but not achieving acceptable levels (Table 3). So, the null hypothesis was not rejected, and no meaningful differences were found between more and less educated mothers in the quality of their infant interactions.

Table 3

One-Way ANOVA for Hypothesis 2a

MTOTAL x SCHNEW	Sum of Squares	df	F	Significance
Between Groups	385.289	1	3.196	.077
Within Groups	13258.988	110		

Hypothesis 2b was tested to determine if more educated mothers scored higher on the KIDI scale than less educated mothers. A one-way ANOVA was performed with categorized maternal education (independent) and KIDI total score (dependent) variables. Group means for more educated mothers (mean = 10.3, SD = 1.91) was almost identical to less educated mothers. The total mean score on the KIDI was 10.17, with a standard deviation of 2.03. The results of the ANOVA demonstrated no significant relationship between education level and knowledge of infant development, thus the null hypothesis could not rejected (Table 4).

Table 4

One-Way ANOVA for Hypothesis 2b

KIDITOT x SCHNEW	Sum of Squares	df	F	Significance
Between Groups	2.880	1	.699	.405
Within Groups	453.548	110		

Hypothesis 3

Hypothesis 3 stated that levels of knowledge regarding infant development are related to the quality of mother-infant interactions. A correlational approach was utilized because dichotomizing the KIDI scores in an effort to run an ANOVA would be to artificially create an inflated measure of knowledge. To test this hypothesis, a Pearson correlation was performed with total NCAST scores and total maternal KIDI scores. The mean score for the total NCAST Teaching scale was 47.2, with a standard deviation of 11.08, while the total KIDI mean score was 10.17, and a standard deviation of 2.02. No statistically significant results were found (Table 5). The analysis failed to reject the null, thus, there was no relationship between the quality of mother infant interactions and levels of knowledge of infant development.

Table 5

Pearson Correlation for Hypothesis 3

		NCAST Total Score	Total KIDI Score
NCAST Total Score	Pearson Correlation	1.000	.133
	Significance (2-tailed)	.	.080
	Number	112	112
Total KIDI Score	Pearson Correlation	.133	1.000
	Significance (2-tailed)	.080	.
	Number	112	112

Hypothesis 4

Hypothesis 4 stated that the quality of mother-infant interactions is related to maternal age, maternal education level, and maternal knowledge of infant development. This hypothesis was tested by a regression analysis, utilizing NCAST Total Score as the criterion (dependent) variable and total KIDI score, maternal grade level completed, and maternal age as the predictor (constant) variables. The regression model results indicated that less than six percent of the variance in infant interactions could be accounted for by the predictor variables. Based on the ANOVA factorial model (F = 1.97, significance = .120), the null hypothesis could not be rejected (Table 6). Thus, mother-infant interactions could not be predicted by maternal age, education level, and knowledge of infant development.

Table 6

Regression Model Summary for Hypothesis 4

Model Summary

Model	R	R Square	Std. Error of the Estimate
1 MTOTAL	.229[a]	.052	10.9420

a. Predictors: (Constant), KIDITOT, Maternal Grade Level Completed, Maternal Age

ANOVA[b]

MODEL	Sum of Squares	df	Mean Square	F	Significance
1 Regression	713.635	3	237.878	1.987	.120[a]
Residual	12930.642	108	119.728		

a. Predictors: (Constant), KIDITOT, Maternal Grade Level Completed, Maternal Age
b. Dependent Variable: NCAST Total Score

Coefficients[a]

Model	Standardized Coefficients	t	Significance
	Beta		
1 (Constant)		4.328	.000
Maternal Age	.039	.370	.712
Maternal Grade Level Completed	.169	1.661	.100
KIDITOT	.108	1.119	.265

a. Dependent Variable: NCAST Total Score

Hypothesis 5

Finally, Hypothesis 5 posited that maternal knowledge of infant development could be predicted by maternal age, maternal education level, and the quality of mother-infant interactions. This hypothesis was tested by a regression analysis using KIDI Total

Score as the criterion (dependent) variable and maternal age, maternal grade level completed, and total score on the NCAST Teaching scale as the predictor (constant) variables. The regression model resulted in an R Square of .069, indicating that only about seven percent of the variance in knowledge of infant development could be accounted for by the predictor variables (Table 7). Based on the ANOVA for the model (F = 2.656, significance = .052) the null hypothesis could not be rejected. The chosen maternal characteristics were not found to be predictive of maternal knowledge of infant development in the present data set.

Table 7

Regression Model Summary for Hypothesis 5

Model Summary

Model	R	R Square	Std. Error of the Estimate
1 KIDITOT	.262[a]	.069	1.9839

a. Predictors: (Constant), NCAST Total Score, Maternal Grade Level Completed, Maternal Age

ANOVA[b]

MODEL	Sum of Squares	df	Mean Square	F	Significance
1 Regression	31.361	3	10.454	2.656	.052[a]
Residual	425.068	108	3.936		

a. Predictors: (Constant), Maternal Grade Level Completed, Maternal Age, NCAST Total Score
b. Dependent Variable: KIDITOT

Coefficients[a]

Model	Standardized Coefficients Beta	t	Significance
1 (Constant)		5.922	.000
Maternal Age	.233	2.308	.023
Maternal Grade Level Completed	-.017	-.163	.870
MTOTAL	.106	1.119	.265

a. Dependent Variable: KIDI Total Score

Discussion

Summary of findings

The present study examined the correlations between maternal age, education, and knowledge of development, which a number of studies have found to significantly affect mother-infant interactions. The only significant relationship uncovered was that of maternal age to maternal knowledge of infant development. This lends support to the growing body of research examining the differences between younger and older mothers in their knowledge of normative infant development. The many influences that may favor older mothers in their more accurate knowledge include a greater number of opportunities to interact with infants and young children, greater emotional maturity, and the higher likelihood of being able to take the perspective of infants.

The results from this study failed to detect significant differences between younger and older mothers on the scores of mother-infant interactions, which would have confirmed a large body of research favoring older mothers. The mean age of the sample mothers was 22.5 years and this may have reduced the power of the data analysis, given

that the distribution was normal, leaving few very young, few much older mothers, and the largest cluster of mothers right around the mean. Utilizing a more dichotomized sample of very young and older mothers might produce more significant correlations on the measures.

Maternal education level completed did not significantly relate to either mother-infant interactions or knowledge of infant development. Given that the sample was fairly evenly divided between those who did and those who did not graduate from high school, the dichotomization of greater and lesser education seems reasonable. As most female high school students do not attend child development or child birth classes, it seems likely that graduating from high school would not directly contribute to higher quality interactions with infants. This would seem to help explain why the KIDI scores were not significantly related to education level as well: graduation does not in itself confer a specialized knowledge base regarding infant development.

Maternal knowledge of infant development was not related to the quality of mother-infant interactions, as it was hypothesized. Previous researchers generally tended to have larger samples of 200 to 300 participants when assessing knowledge of infant development, thus the present population of 112 mothers may have reduced the power of the analysis. The shortened KIDI scale used in this study consisted of only 14 of the original 75 items on MacPhee's (1981) original measure. A Cronbach's alpha was calculated for this study with that 14-item scale that was only .44, much lower than MacPhee's original alpha of .71. This indicates that the present KIDI may be registering many different multi-dimensional components that are not homogeneous, and do not group together very smoothly. The constraints of the secondary data may thus have

indirectly reduced the strength of the potential correlations. Future researchers should pay particular attention to the validity of the aspects they are attempting to measure.

It may also be possible that the interdependent relationships between maternal knowledge, education, and age play only small roles in the ways in which mothers interact with their infants. The predictive value of the regressions in the present study certainly point in that direction. These results shed light on intermeshing components of mother-infant interactions, and highlight the value of utilizing a developmental contextual framework to encompass the rich diversity of family systems functioning.

How Information is Used In a Theoretical Base

While previous researchers have correlated low levels of maternal knowledge of infant development with poorer quality interactions and home environments, there has been little attempt to explain precisely how this lack leads to less than adequate parenting (Karraker & Evans, 1996). How mothers respond to questions regarding *normative* child development cannot be assumed to provide direct information about mothers' expectations for their *own* infants' growth and development. Karraker and Evans (1996) are quick to point out that researchers should not assume that "general knowledge about infant development will be applied in a logical fashion to the mothers' interpretations of and expectations for their own infants" (p.663). Stevens (1984) found that knowledge of normative development contributed less to predicting parenting skill than did parents' awareness of the "potency of play materials, of the value of parental teaching, of the importance of monitoring infant health, and their awareness of interactional strategies which promote language development" (p.241).

Knowledge regarding development may or may not be internalized by mothers, and may or may not be expressed by improved sensitivity in responding to infants. In Taylor's (1991) intervention study of 72 at-risk mothers and their infants, there were no significant gains in maternal sensitivity and responsivity after the program concluded. The author cited Goodnow's (1988) review of "belief-behavior consistency," in which she concluded that overall results from parenting programs have not been encouraging (Taylor, 1991). What factors might account for this discrepancy between parents' ideas and actions has been little resolved in the last decade. Findings from a study by Conrad and colleagues (1992) provide one interesting clue related to maternal confidence. They found that mothers who were least knowledgeable about development but who remained confident about their parenting abilities had the least positive interactions with their infants. The authors speculated that these "mothers may be unrealistically confident because they fail to recognize breakdowns in their interactions with their children and are uninformed of the possible consequences" (Conrad et al., 1992, p.360). Thus, both specific information relevant to infant characteristics and self-confidence in parenting appear to be possible factors accounting for discrepancies between parental knowledge and parental caregiving behaviors.

Maternal working models of attachment relations are another way in which the quality of mother-infant interactions may be affected (Jennings et al., 1991). Main and Goldwyn (1984) suggest that working models of relationships influence mothers' abilities to respond to their infants in a contingent and sensitive manner (cited in Crowell & Feldman, 1989). This working model is believed to act as a filter through which the primary mother-infant relationship is "understood, organized, and responded to" (Crowell

& Feldman, 1989, p. 175). Ideas about the self and about others develop within this primary, reciprocal relationship in which the infant develops expectations that his or her efforts are likely to be successfully met (Jennings et al., 1991; Pridham et al., 1994).

Knowledge of infant development forms the foundation from which specific expectations for the mothers' own infants' behavior and development are formulated. These expectations about their own infants then inform the ways in which mothers engage their infants. For example, mothers who believe that average infants achieve a particular milestone earlier than infants actually do should expect too much of their infants. This false expectation may inform the ways she behaves with her infant by encouraging and attempting to maintain the expected behavior, and this may have possible deleterious effects on the infant (Karraker & Evans, 1996). Low tolerance and unrealistic expectations of development may contribute to impatience with infant distress behavior, in the form of fussing, crying, and avoidance reactions. Haskett, Johnson, and Miller (1994) reported that rigid parenting attitudes and inappropriate expectations of children were among the risk factors for abuse in their sample of adolescent mothers (cited in Milburn, 1997).

Conversely, when mothers respond *appropriately* to their infants' cues, they are often better able to meet the needs of the infant by engaging in "a reciprocal, mutually gratifying relationship" (Jennings et al., 1991, p.277). Goodness-of-fit, or degree of match, between infants and mothers was demonstrated in a study of 285 families to be a "salient and significant predictor of family adjustment during the first year of life" (Sprunger et al., 1985). Focusing on infants' needs, holding a child-centered perspective, has been validated in the research literature as positively contributing to high quality

mother-infant interactions. Miller-Loncar and colleagues (1997), in their study of 323 premature and full-term infants, found that mothers' child-centered perspective was associated with more warmth and responsiveness and less restrictiveness during daily activities such as feeding, dressing, and bathing. The authors note that this child-centered working model may be an important mechanism through which social support, self-esteem, and childrearing history influence parenting behavior.

Thus, knowledge of infant development serves in many capacities as facilitating the match or best-fit between mothers and their infants, specifically in responding appropriately to infant cues.

Mothers' perceptions of both their competency as parents and of their child's needs and abilities play a crucial role in the ways in which they engage and stimulate their children. The ability to step outside one's own viewpoint to focus on a child's needs and actions has been shown to be a critical determinant of a mother's expectations of her child and of her ability to sensitively parent (Belsky, Robins, & Gamble, 1984; Dix, 1991; cited in Miller-Longcar et al., 1997). A mother's maturity and intelligence are significant contributors to this child-centered perspective-taking, enabling her to cope with the ongoing demands of parenting as well as to effectively engage in reciprocal exchanges with her child (Luster & Okagaki, 1993; Miller-Longcar et al., 1997; Stevens, 1984). Researchers have found that mothers possessing more flexible, child-centered perspectives displayed more optimal parenting behaviors that were warm and responsive to their children's interests than mothers who were less child-centered. Certainly, knowledge of infant and child development contributes in a significant manner to the formation of this child-centered outlook, in that understanding what children need and are

able to communicate as they grow influences the ways in which a mother chooses to interact with her child. It has been suggested that this child-centered perspective is additionally informed by maternal social support, self-esteem, and child-rearing history (Miller-Loncar et al., 1997).

In the first year of life the responsiveness of environmental sources of support and information tends to facilitate maternal sensitivity to infant cues, maternal self-confidence, and maternal self-esteem (Blackburn, 1986; Creasey & Jarvis, 1994; Luster, 1985; Sprunger et al., 1985; Teti & Gelfand, 1991). Maternal responsiveness to the distress cues of the infant involves a complex reciprocal feedback process that strengthens the relationship between mother and infant, as well as reinforces maternal self-competence and self-esteem (Del Carmen et al., 1993; Teti & Gelfand, 1991).

Finally, mother-infant interactions are affected by maternal characteristics and the cultural environmental context in which parenting occurs. Maternal coping mechanisms, interaction style, values, personality, and maternal history all distinguish individual differences in parenting behavior (Luster & Okagaki, 1993). The present study sampled a relatively homogeneous, lower socioeconomic status group of mothers who are likely to share similar cultural expectations about nurturing children. Cultural context necessarily shapes the ideas parents have about how the world works, what abilities one needs to survive and be successful in the world, and childrearing expectations and norms (Luster & Mittelstaedt, 1993; Okagaki & Divecha, 1993). It is important to keep in mind contextual factors impacting mothers and their infants, such as levels of perceived stress, socioeconomic status, psychological attributes, personality characteristics, and social support networks. Maternal caretaking skills and feelings of self-esteem, competence,

and positive regard for their infants are all, at least in part, influenced by maternal age, education level, cultural context, and knowledge of infant development (Parkinson & Harvey, 1987; Teti & Gelfand, 1991). Thus, future researchers must be sensitive to and knowledgeable about the cultural history and expectations that differentiate mother-infant dyads from one another.

Assumptions and limitations

1. This study has limited generalizability. Findings are restricted to primarily white, low-income mothers living in a mid-size Midwestern city whose children are in programs similar to Early Head Start.

2. The participants are self-selected from Early Head Start Family Development Project and Jackson Community Agency services. This may indicate that these mothers' willingness to seek social services differentiates them from other mothers in similar geographic areas and from mothers of similar SES.

3. It is assumed that participants answered questionnaires honestly and accurately, both for themselves and for information pertaining to their children.

Implications for future research

Previous findings have demonstrated the critical influence of knowledge of infant and child development in family systems dynamics, including its impact on the ways in which mothers and infants interact (Watson et al., 1996). The results of the present study did not support these findings. The contextual model which has inspired the present

study, however, seems to support a dynamic, intermeshing systems framework for studying family interactions, which resists extricating one variable from another.

However, future research endeavors should investigate more detailed questions regarding what kinds of developmental information parents (especially mothers) encounter, how they process this new information, why they seek out particular sources for parenting information, when and how they are most likely to incorporate this knowledge into their behavioral repertoire, and what roles previous experiences with children, personal history, ethnicity, intelligence, and social support play in how they incorporate child development information into their interactions in their family systems. Stevens (1984) notes that parental variables such as empathy, interpersonal sensitivity, role-taking ability, maternal cognitive development, previous experience with children, and social integration must also be taken into account in order to more fully understand how information is translated into parental behavior. Extant research literature has documented the supportive influence of fathers and partners, social support networks, health workers such as pediatricians and nurses, and other, media-oriented sources of child development information in promoting positive, nurturing mother-infant interactions.

Fathers' emotional, financial, and cognitive support for mothers has demonstrated an ameliorative affect on maternal well-being and mother-infant interactions. Westney and colleagues (1988) found that participating adolescent fathers tended to use more supportive behaviors toward adolescent mothers and their infants than non-participant fathers, and that this nurturing behavior was strongly positively correlated with the fathers' levels of infant development knowledge. Other researchers have characterized

paternal parenting attitudes as operating directly upon mothers' perceptions of support and maternal psychological well-being (Belsky, 1984; Brunelli et al., 1995). Fathers' or partners' emotional support has been associated with better communication between mothers and their children, and with more successful maternal control in these interactions (Brunelli et al., 1995). High quality marital relationships have been likewise correlated with more positive parenting attitudes and greater sensitivity with infants than marriages that are less close and less intimate (Okagaki & Divecha, 1993). Roles fathers and other partners provide for mothers and infants need continued study situated within a contextual framework in order to best advance our understanding of this aspect of mothers' sensitivity with their children.

Work with minority mothers' social support networks illustrates the importance of utilizing a developmental systems perspective in examining mother-infant interactions. Burchinal, Follmer, and Bryant (1996) note that in their study of low-income African American mothers and infants, the size of social support network influences caregiving behavior by "providing a context that facilitates positive parenting styles" (p.1080). Mothers in Burchinal's study who reported larger networks were more responsive, accepting, and involved, and less directive in controlling their children's behavior. This indicates that mothers may develop feelings of competence and satisfaction in their caregiving roles through contact with role models, sources of child development information, and persons who can share some of the responsibilities of parenthood, leading to an increase in responsive caregiving.

Health workers can also impact caregiving environments mothers provide for their infants (Jordan, 1985; Pillitteri, 1992). Researchers have demonstrated the

importance of incorporating information and education, especially for young mothers, into medical check-ups prenatally, following delivery, and throughout the early years during well child checkups (Elster; 1978; Field, 1980; Polit, 1989; Smith, Weinman, Johnson, Wait & Mumford, 1985; cited in Collins & Chacko, 1993). Nurses in particular, by providing accurate child development information, may be influential in future mother-infant interactions (Jordan, 1985). Mothers expect medical professionals to have reliable and useful information regarding infant and child developmental norms, milestones, and general ideas regarding the emotional, physical, and psychological health of their children (Okagaki & Divecha, 1993; Zero-To-Three, 1999). Thus, future research should investigate the ways in which health workers present information to mothers and fathers, and what specific knowledge they are conveying.

Implications for Practitioners

The results of the present study are particularly relevant for those working with mothers and their young children in a variety of social service settings. Examining the general group variables of older and younger mothers, more and less knowledgeable mothers, and mothers who have and who have not graduated from high school, it was anticipated that the present investigator would uncover significant differences between these groups on their observed infant-interactions. This did not occur. The only significant relationship that turned up was that of maternal age to total scores on the KIDI measure. It also follows common sense that older mothers, who in general may have had more experiences with infants, would score higher on a rating of their knowledge. What those older mothers do with that knowledge, however, became lost in the shuffle of other

factors, which may or may not have included number of other children, marital status, social support, ethnicity, maternal child rearing history, maternal psychological health, or any other number of factors that the present study could not encompass. The quality of the interactions between infants and mothers also could not be predicted by the three simple variables chosen for the present study (i.e., age, education, knowledge level). This provides support for the multiply-determined nature of parenting behaviors, attitudes and beliefs.

It is important for those professionals working with infants and their families to bring with them a general understanding of, and appreciation for, these complexities and the changes that family members tend to undergo over time. Research has demonstrated that a combination of maternal characteristics involving the ability to cope, higher self-esteem, and lower anxiety have been found to be important to the quality of parenting (Brunnquell et al., 1981; Heinicke et al., 1983; cited in Hann, 1989). Practitioners must take into account complex contextual systems in which mothers are immersed, and how these systems are shaped by family size, sociocultural background, division of child-care responsibilities in extended families, marital status over time (Luster & Mittelstaedt, 1993). Thus, both maternal characteristics and the cultural environment in which families live should be taken into account, even if it is in an informal fashion, when observing parenting skills in the field.

The results of this study attest to the fact that researchers certainly don't have all the answers. Although other studies have found age, education level, and/or knowledge of development to be significantly related to the quality of mother-infant interaction, they have been unable to adequately describe how these variables influence maternal behavior.

Maternal attitudes, beliefs, past experiences, values, perceptions of support and competency affect and are all affected by mothers' interactions with their own friends and families, professional service workers, medical workers. If those interactions with other adults are perceived as positive and enjoyable, it is likely that the advice and information mothers are exposed to will be taken into consideration. Practitioners in the field can play an influential role in providing developmental information to mothers by first attempting to make themselves familiar with the complex family systems in which their clients are situated.

The present study gained inspiration from Lerner's developmental contextualism model. If the tenets of this model are incorporated into a service delivery approach, practitioners may find that the ability to take the perspective of their clients is not only much easier the more specific details they know about how clients make decisions, but that they can genuinely empathize with their clients' self-perceptions. Coming to understand why a particular client makes the decisions she does can be a primarily goal of practitioners. This approach may surely prove to be much more fruitful, in terms of meeting service goals, than simply bringing to the intervention categorical assumptions about clients because of their age or education level. Human beings change others and are changed through interactions with others throughout the courses of their lives (Lerner, 1991). Examining both the relationships between family members and friends, and how well parents can communicate their needs to themselves and others, provides practitioners with powerful windows from which to view the continuum of environmental influences impacting mother-infant interactions. From this specific knowledge base, the best possible interventions can be planned, coordinated, implemented, and evaluated.

Appendix

MICHIGAN STATE
UNIVERSITY

March 12, 1999

TO: Dr. Robert GRIFFORE

107 Human Ecology

Department of Family and Child Ecology

RE: IRB# **99159** CATEGORY: 1-E

APPROVAL DATE:March 9, 1999

TITLE:MATERNAL KNOWLEDGE OF INFANT DEVELOPMENT: LINKS TO QUALITY OF MOTHER-INFANT INTERACTIONS AND HOME ENVIRONMENT

The University Committee on Research Involving Human Subjects' (UCRIHS) review of this project is complete and I am pleased to advise that the rights and welfare of the human subjects appear to be adequately protected and methods to obtain informed consent are appropriate. Therefore, the **UCRIHS approved this project.**

RENEWALS: UCRIHS approval is valid for one calendar year, beginning with the approval date shown above. Projects continuing beyond one year must be renewed with the green renewal form. A maximum of four such expedited renewals possible. Investigators wishing to continue a project beyond that time need to submit it again for a complete review.

REVISIONS: UCRIHS must review any changes in procedures involving human subjects, prior to initiation of the change. If this is done at the time of renewal, please use the green renewal form. To revise an approved protocol at any other time during the year, send your written request to the UCRIHS Chair, requesting revised approval and referencing the project's IRB# and title. Include in your request a description of the change and any revised instruments, consent forms or advertisements that are applicable.

PROBLEMS/CHANGES: Should either of the following arise during the course of the work, notify UCRIHS promptly: 1) problems (unexpected side effects, complaints, etc.) involving human subjects or 2) changes in the research environment or new information indicating greater risk to the human subjects than existed when the protocol was previously reviewed and approved.

If we can be of further assistance, please contact us at 517 355-2180 or via email: UCRIHS@pilot.msu.edu. Please note that all UCRIHS forms are located on the web: http://www.msu.edu/unit/vprgs/UCRIHS/

Sincerely,

David E. Wright, Ph. D.
UCRIHS Chair

DEW: bd

cc: Douglas Todak

OFFICE OF
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