THE RELATIONSHIP OF INFANT FEEDING METHOD AND ADOLESCENT MOTHER-INFANT INTERACTION

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Chapter 1

Introduction

Adolescent pregnancy and parenthood has been an area of extensive research for three decades (Furstenberg, 1976; Chilman, 1980; Furstenberg, 1991). More recently, attempts were made to examine the quality of adolescent mothering through specific maternal behaviors, such as, responsivity, verbalizations, patterns of physical contact, affect and mother-infant eye-to-eye contact (Culp, Culp, Osofsky, & Osofsky, 1991; Coll, Hoffman, & Oh, 1987). The literature repeatedly identified the children of adolescent parents as high risk, citing problems in school, higher drop-out rate and longer duration of dependence on welfare (Furstenberg, 1976; Miller & Moore, 1990). However, among the literature concerning adolescent parents there was a predominant focus on global measures and macroanalysis.

Maternal-infant contact has been identified as a significant correlate in maternal-child relationships and later child outcomes, yet few studies examined the influence of infant feeding method, specifically breastfeeding versus bottlefeeding (Spitz, 1965; Kennell & Klaus, 1979; Jelliffe & Jelliffe, 1978). Breastfeeding, necessarily, increased overall mother-infant contact as well as increased face-to-face contact (Kennell & Klaus, 1979; Jelliffe & Jelliffe, 1978). Research concerning infant feeding method has documented health, immunological, psychological, and socioeconomical benefits of breastfeeding in third-world countries and lower socioeconomic populations (Jelliffe & Jelliffe, 1978; Williams, Baumslag, & Jelliffe, 1985; Howell, Morriss, & Pickering, 1986).

Trends have also been identified favoring breastfed children in social-cognitive development (Morrow-Tlucak, Haude, & Ernhart, 1988; Fergusson, Beautrais, & Silva, 1982; Taylor & Wadsworth, 1984).

Significant gaps were identified in the adolescent mother-infant literature. Generally speaking, studies with adolescent mothers compared them with adult mothers. Little effort was made to describe differences (other than demographic data, such as maternal age, education, and socioeconomic status) between adolescent mothers who were responsive and synchronous with their babies, from adolescent mothers who were less responsive and synchronous with their babies. Another gap identified in the adolescent mothering literature concerned infant feeding method. Few studies discussed breastfeeding adolescents and even fewer examined infant feeding method as a possible influencing factor in adolescent mother-infant interaction.

This study addressed these deficits in adolescent literature. Chapter 1 introduces the issue of adolescent mother-infant interaction and the lack of consideration of feeding method as a factor. Chapter 2 presents a review of the literature, beginning with an overview of breastfeeding literature followed by a more complete review of adolescent breastfeeding literature. The review chapter is concluded by an overview of mother-infant interaction literature followed by a more focused review of adolescent mother-infant interaction. Chapter 3 focuses on the purpose and the actual hypotheses of the current study. Subject selection, procedures and methods used are discussed in Chapter 4. Results and analyses are presented in Chapter 5 followed by discussion of the findings with future implications in Chapter 6. A selected bibliography and the appendixes are found after Chapter 6.

Chapter II

Review of the Literature

This study examined the relationship of adolescent infant feeding method and adolescent mother-infant interaction incorporating microanalytical behavioral measures to address an identified deficit in adolescent literature. Initially, an overview of the breastfeeding literature is presented. It is followed by a more comprehensive review of adolescent breastfeeding literature. Next, an overview of mother-infant interaction is presented, followed by a focused review of adolescent mother-infant interaction.

Breastfeeding

Breastfeeding has been extensively researched throughout the world and was proclaimed the superior food for newborns by the World Health Organization, UNICEF (Teply, 1979), the American Academy of Pediatrics (Executive Summary of Task Force on Infant Feeding Practices, 1984) and the American Dietetic Association (Position Paper, 1986). The National Center for Education in Maternal and Child Health set the goal of establishing breastfeeding as the societal norm (Sharbaugh, 1991). The United States Department of Health and Human Services established national objectives for 75 percent of all babies born in the United States to be breastfed at the time of hospital discharge and for 50 percent of all mothers to continue breastfeeding to at least 6 months postpartum (cited in Gielen, Faden, Campo, Brown, & Paige, 1991, p. 298). The American Dietetic Association stated breastfeeding was advocated "because of the nutritional and immunologic benefits of human milk and the physiological, social and hygienic benefits of the breastfeeding

process for the mother and infant" (Position Paper, 1986, p. 1580). Even as recently as 1992, the American Academy of Pediatrics stated that breast milk is the optimal nutritional source for infants and that they should receive breast milk for the first six to 12 months of life.

This review will represent the findings among breastfeeding research. Literature regarding the incidence of breastfeeding in the United States will be presented first, followed by reviews of the effects of breastfeeding on health, social and cognitive development. Summary of these data will be followed by review of adolescent breastfeeding literature.

Incidence of Breastfeeding in the United States

The incidence of breastfeeding in the United States increased steadily through the 1970's and into the mid 1980's (Martinez & Dodd, 1983; Martinez & Nalezienski, 1981; Martinez & Nalezienski, 1979; Executive Summary of Task Force on Infant Feeding Practices, 1984). Kennell, Voos, and Klaus (1979) identified an increase of breastfeeding occurrence that coincided with hospitals offering to let babies stay in the same room as the mothers instead of keeping the babies in a separate nursery. Koop (1984) cited Martinez et al., (1979, 1981) identifying breastfeeding rates in the United States at 45% in 1978. In an effort to endorse and promote "breast as the community norm", Koop (1984) projected the incidence of breastfeeding should be 75 percent by 1990.

Some researchers took issue with the size and distribution of the increase as identified by the Ross Laboratory studies conducted by Martinez and colleagues (Biegelson, Cowell, & Goldberg, 1986; Grossman, Larsen-Alexander, Fitzsimmons, & Cordero, 1989; Rassin,

Richardson, Baranowski, Nader, Guenther, Bee, & Brown, 1984). These researchers argued with Martinez et al. (1983, 1981, 1979) reporting substantial increases in breastfeeding among women of lower socioeconomic status and women with lower levels of education. The arguments focused on the under-representation of these populations in the Martinez samples, stating the results were only manipulated estimations of the occurrence of breastfeeding among women with lower educations and of lower socioeconomic status (Grossman et al., 1989; Biegelson et al., 1986; Rassin et al., 1984).

Rassin et al. (1984) found a much lower incidence of breastfeeding among their population of lower-income families in the Galveston area. They found a rate of 27 percent as compared with the 39.9 percent reported by Martinez and Nalezienski (1981). Biegelson et al. (1986) found only 2.7 percent of women breastfeeding among a population of women using public health clinics in New York City in 1979. The incidence increased to 3.2 percent by 1982. By contrast Grossman et al. (1989) identified an increase in incidence of breastfeeding from 16 percent to 22 percent among a population of high-risk, economically disadvantaged women in Ohio from 1976-1985.

The Ross Laboratories Mothers' Survey has been the major vehicle for documenting breastfeeding trends in the United States for several decades, and has continuously striven to improve reporting efficiency (Ryan, Rush, Krieger, & Lewandowski, 1991). Ryan et al. (1991) revealed a dramatic decline in breastfeeding initiation and a decrease in breastfeeding duration since 1984. The sharpest decline in breastfeeding initiation occurred at the lower income level among younger black women with only grade school education. The profile of the breastfeeding woman identified by the Ross studies has remained fairly constant and continues to indicate breastfeeding more likely

to occur among older, higher educated, married, middle to upper-middle class, Caucasian women. These trends have been confirmed by other sources (Jacobson, Jacobson, & Frye, 1991; MacGowan, MacGowan, Serdula, Lane, & Joesoef, 1991).

Effects on Health and Physical Development

Multiple health advantages have been linked with breastfeeding, although some researchers contend the benefits have not been empirically substantiated (Goldman, Atkinson, & Hanson, 1987; Bauchner, Leventhal, & Shapiro, 1986). Lawrence (1989) discusses in detail the composition of human milk proposing its superiority in nutritional content, its immunologic benefits and the species-specific enzymes that protect the intestines of infants. Specific benefits identified include decreased incidence of gastroenteritis (Fomon & Filer, 1974; Kovar, Serdula, Marks, & Fraser, 1984; Howie, Forsyth, Ogston, Clark, & du V Florey, 1990), decreased respiratory infections, hospitalizations (Kovar et al., 1984; Howie et al., 1990), and decreased morbidity and mortality rates (Lawrence, 1989). Some studies have also examined the influence of breastfeeding on social-cognitive development (Menkes, 1977; Rodgers, 1978; Fergusson, Beautrais, & Silva, 1982; Taylor & Wadsworth, 1984; Morrow-Tlucak, Haude, & Ernhart, 1988). Each of these areas will be reviewed briefly, with greater attention to the section on social-cognitive outcomes.

Despite the methodological limitations, in a review of studies examining breastfeeding impact on infections, Kovar et al. (1984) identified a significant association between breastfeeding and lower rates of gastroenteritis and diarrhea among infants. The decreased incidence of infection and hospitalizations were attributed to

numerous host resistance factors identified in human milk. More recently, Howie et al. (1990) found that infants who had been breastfed longer than 13 weeks had significantly fewer incidence of gastrointestinal illnesses up to one year of age than infants who were bottlefed or infants who were breastfed but before 13 weeks. These differences maintained significance whether the mother introduced supplements or not and whether the mother weaned after 13 weeks or continued breastfeeding the entire year. These researchers attribute the protection to immunoglobulins, lactoferrin, bifidus factor, and numerous species-specific enzymes found in human milk.

A review of the studies indicating decreased respiratory infections and hospitalizations were more seriously confounded and most significant measures disappeared when controlling socioeconomic status and other family/social factors (Kovar et al., 1984). However, the trend of lower incidence of respiratory infections, lower hospitalizations and decreased otitis media favoring breastfed infants and associated with duration of exclusive breastfeeding was substantiated (Kovar et al., 1984; Lawrence, 1989). Howie et al. (1990) found weaker significance favoring breastfed infants in occurrences of respiratory illnesses, but the significance remained. They, however, found no relationship between feeding method and occurrences of ear, eye, mouth or skin infections.

Rubin et al. (1990) argued other studies used improper procedures and statistical analyses. Their study of 500 women in Copenhagen, Denmark found no significant feeding effect for protection against infection in an urban population. However, they did note a trend favoring breastfed infants with decreased occurrences of otitis media. Bauchner, Leventhal, and Shapiro (1986) also argued the validity of studies examining benefits of

breastfeeding, and stated those conducted in industrialized populations were seriously confounded. Amidst all this disagreement, all the researchers were quick to substantiate studies favoring breastfeeding in developing countries or lower socioeconomic populations.

Decreased mortality rates among breastfed infants was most significant in underdeveloped countries but one study examined death rates among several European cities and U.S. cities. Knodel (1977, in Lawrence, 1989) did not include rates within the first few days of life, but the study clearly implicated breastfeeding as beneficial in decreasing infant mortality.

Social and Cognitive Development

Numerous researchers have examined the impact of feeding method on social and cognitive development at different stages using a variety of developmental measures. In this context social development referred to maternal behaviors identified as interactional in early infancy, generally, visual, verbal or tactile behaviors. Cognitive development refers to intellectual and behavioral development most often measured by intelligence tests and the Bayley Mental Development Index, a measure specifically designed for infants aged one month to two and one-half years. Menkes (1977), Rodgers (1978), Fergusson, Beautrais, and Silva (1982), Taylor and Wadsworth (1984), and Morrow-Tlucak, Haude, and Ernhart (1988) each linked feeding method and later cognitive development, with breastfed children having more favorable scores. However, it was unclear whether these researchers were claiming the differences were a result of nutritional elements of breastmilk or some other aspect of breastfeeding, such as increased tactile contact. Dunn and Richards

(1977) identified significant differences in interactional behaviors of breastfeeding women and bottlefeeding women.

Menkes (1977) examined feeding method and its association with learning disorders based on previous research identifying a relationship between high protein content feedings and low intellectual performance (Rassin, Gaull, Raiha and Heinonen, 1977; Mamunes, Prince, Thornton, Hunt and Hitchcock, 1976). Human milk is about 0.9 percent protein while cow milk is 3.4 percent protein (Lawrence, 1989). Menkes found that only 13.9 percent of his sample of learning disabled children were breastfed while 47.2 percent of the control group (non-learning disabled children) were breastfed. However, children consuming low protein content formula did not show better intellectual performance.

In an effort to replicate Menkes' findings with a more substantial sample and controlling for family factors, Rodgers (1978) used data collected in the 1946 National Survey of Health and Development of Great Britain. This study was longitudinal, conducting parental interviews shortly after birth and every two years until the child turned 15 years old. The sample consisted of 1133 survey children known to be entirely bottle-fed and 1291 children never bottle-fed. Scores reported were picture intelligence and reading scores at eight years of age and reading attainment scores at 15 years of age. All points of analysis significantly favored breastfed children over bottlefed children.

Fergusson, Beautrais and Silva (1982) examined the relationship of breastfeeding and cognitive development at three, five, and seven years on a birth cohort of New Zealand children. This study was conducted with 1037 children at age three, 991 at age five, and 954 at age seven. Feeding method was classified into 3 groups;

bottlefed, breastfed up to 4 months, and breastfed 4 months or longer. No effort was made to separate exclusively breastfed from breast and bottle combinations. Cognitive development was measured by the Peabody Picture Vocabulary Test at three years, the Stanford-Binet Intelligence Scale at five years and the Weschler Child Intelligence Scale at seven years. Measures of language development included the Reynell Developmental Language Scales and the Illinois Test of Psycholinguistic Abilities. Articulation was measured with the Dunedin Articulation Screening Scale. Significant effects for both sex and breastfeeding were found for all variables with no interaction effect found for breastfeeding by sex. Further analysis examining the association between breastfeeding and each test score showed a marked decrease in the difference between bottlefed and breastfed infants when controlling for the correlated effects of the child's sex and a variety of demographic factors such as socioeconomic status.

Taylor and Wadsworth (1984) used the Child Health and Education Study of Britain to evaluate breastfeeding and its association with children's development at five years. Their sample included 13,135 children living in England, Scotland and Wales at five years. Home health visitors obtained feeding histories, history of speech problems, children's height and head circumference. The home health visitor also administered the English Picture Vocabulary Test (EPVT), obtained a copying design score, child behavioral score and a maternal malaise score. Breastfeeding was a significant factor in EPVT and copying design scores but the social index, behavioral scores, child's birth weight and home environment all had statistically more significant influences. No significance was identified between breastfeeding and speech problems, child's height

or head circumference.

Morrow-Tlucak, Haude and Ernhart (1988) conducted a study with 219 low-income mother-infant pairs, using rigorous covariate control of numerous demographic and background variables such as maternal educational level, race, socioeconomic level, drug/alcohol history and use during pregnancy. Maternal intelligence was measured by the Peabody Picture Vocabulary Test-Revised (PPVT-R) and child-rearing attitudes were determined according to the Authoritarian Family Ideology (AFI), a 41-item forced-choice questionnaire. Infant cognitive development was assessed at six months, one year and two years with the Bayley Mental Development Index, composed of three separate scales: the Mental Scale assessed sensory-perceptual acuities, object constancy, vocalizations; the Motor Scale assessed coordination and control of the body, large motor and finer manipulatory abilities; and the Infant Behavior Record evaluated a child's social orientation and responsiveness. In addition, the HOME screening questionnaire, a 45 item presence/absence checklist, was completed for each pair. Statistical analyses revealed differences favoring breastfed infants over bottlefed infants on the Bayley at six months, one year, and two years. The differences did not reach significance at six months, but the same trend was identified at six months that did reach significance at one year and two years. Bayley scores strongly correlated with breastfeeding and duration of breastfeeding with the infants who were breastfed longest having the highest scores and those breastfed four months or less scoring better than those never breastfed.

Dunn and Richards (1977) observed five feeding episodes over the first ten days of life for 77 mother-infant pairs. Mothers were observed for tactile, verbal, and visual behaviors with

differentiations made in each modality. For example, there were distinctions made between vocalizations urging baby along in the feeding and vocalizations that were not related to the activity of the feeding. Infants were observed for sucking, non-sucking, nipple in mouth or out of mouth, delay in crying when nipple out of mouth, ending of feeding. Breastfed infants were found to have fewer and longer feeding episodes. Behaviors of the breastfeeding mothers were found to be patterned by the baby's activity being more likely to kiss, rock and touch their babies during sucking bouts and to talk to their infants during gaps between sucking. The content of the breastfeeding mothers verbalizations were more often unrelated to the feeding, whereas, bottlefed mothers vocalizations were more often during sucking bouts to encourage the sucking. Interestingly, the end of the feeding session was as likely to be determined by the infant as the mother among breastfed dyads, but the mother most often ended the feeding in the bottlefed group.

Several of these studies were retrospective, interview studies confounded by variables the researchers failed to examine, such as identifying what aspect of breastfeeding was responsible for the differences. Only Taylor and Wadsworth (1984) and Morrow-Tlucak et al. (1988) included maternal age as a variable and the least represented population among their samples were children born to young, unmarried mothers. Other factors excluded were socioeconomic level and race. Morrow-Tlucak et al. (1988) proposed the importance of considering breastfeeding as a confounding variable in future child development research based on their findings among a homogeneous group of low-income subjects. Even in 1977, Dunn and Richards encouraged feeding method to be considered as a variable in analysis of mother-infant interaction and implied that a "finer level

of analysis" (p. 451) may be needed to examine interaction. Following, is a review of existing breastfeeding studies within the adolescent literature.

Breastfeeding Research Among Adolescents

Numerous correlates and predictors have been identified for feeding choice, such as maternal age, educational level and marital status (Grossman et al., 1989; Switsky, Vietze, & Switzky, 1979; Kurinj, Shiono, & Rhoads, 1988; Rassin et al., 1984; Kennell, Voos, & Klaus, 1979; Correil & Murphy, 1988). As mentioned earlier, the literature indicated breastfeeding was most likely to occur among older, higher educated, married, middle to upper-middle class women. This appeared to be based upon a seriously deficient supply of literature about adolescent breastfeeding. This deficiency was possibly induced by the fact that until the American Academy of Pediatrics actually proposed promoting breastfeeding among pregnant adolescents in 1982, it was widely accepted that adolescents were unable to produce healthy milk, and that even the effort might harm their own physical development (Yoos, 1985; Pascoe, 1982; Stotland & Peterson, 1985).

Studies regarding breastfeeding among adolescents examined the adolescent's diet, breast milk composition, health effects (Lipsman, Dewey, & Lonnerdal, 1985; Cunningham, 1983; Chan, Ronald, Slater, Hollis, & Thomas, 1982) and reasons for choosing breastfeeding as their infant feeding method (Stotland & Peterson, 1985; Yoos, 1985; Joffe & Radius, 1987; Ray & Estok, 1984). Maternal age as a correlate of breastfeeding indicated that even among adolescents the younger the mother the less likely she was to choose breastfeeding as her feeding method (Neifert, Gray, Gary, & Camp, 1988).

Effects on Health in Adolescence

Lipsman, Dewey, and Lonnerdal (1985) examined maternal dietary intake, breast milk composition and infant growth among 25 lactating mothers aged 14-20 years. When compared to a control group of 20 lactating mothers, ages 21-36 years, the lactose content of the adolescent's breast milk was lower but protein, magnesium, potassium and sodium levels were higher. The differences were all statistically significant. In spite of these differences the infants of the adolescent mothers thrived and maintained weight gains within normal limits.

Studies concerning bone mineral loss in lactating adolescents concluded that the advantages of breastfeeding to the mother and baby outweigh the risks involved for the mother (Cunningham, 1983; Chan et al., 1982). Stotland and Peterson (1985) proposed that motherhood and breastfeeding might be an avenue of assisting adolescents in achieving mastery of life's role leading to clinically significant changes in personal and familial outcomes.

Correlates of Breastfeeding in Adolescence

Yoos (1985) found among a group of 50 adolescents aged 15-19 years that those who chose breastfeeding gave infant-oriented reasons for their choice, such as, "It's best for the baby." Mothers who chose bottle feeding gave self-oriented reasons for their choice, such as, "I don't want to be tied down." This pattern of reasons for feeding method choices was also documented among older mothers (Switzky, Vietze, & Switzky, 1979).

Joffe and Radius (1987) found among a group of 254 pregnant adolescents 12-19 years of age that the strongest correlate for choosing breastfeeding was knowledge about breastfeeding. Next in

significance was the perceived benefits of breastfeeding, such as feeling important, better than formula, natural, modern, easier, more convenient, less mess. Social support and personally knowing someone who breastfed also contributed to the decision. The main correlates for those choosing bottle feeding were the perceived barriers of feeling rundown and the breasts becoming ugly after breastfeeding.

Neifert, Gray, Gary, and Camp (1988) examined factors influencing breastfeeding among adolescents in a population of 244 adolescent mothers under 18 years of age. They found no correlation between initiation of breastfeeding and method of delivery, infant APGAR score, birth weight, gestational age or gender. They did find older mothers more likely to breastfeed and Caucasians significantly more likely to breastfeed than minorities. Sixty mothers from the 244 met predetermined criteria and gave their consent to participate in a follow-up study at 2 weeks and 2 months. The correlates identified with breastfeeding were maternal age, ethnicity, maternal educational level, age at which baby first supplemented, and maternal support. The primary reason given for choosing breastfeeding was, "It's good for the baby." In the follow-up studies it was found that 57 percent of the mothers weaned within the first two months. The two highest correlates with early weaning were early problems with nursing and embarrassment.

Using a self-report questionnaire, Ray and Estok (1984), identified six factors that influenced adolescent breastfeeding choice. These were in order: physiological benefits for the baby, belief in certain physiological benefits for the mother, trend to return to nature, fear of being tied down, need to return to school/work, concern with the effect of breastfeeding on one's own body. The primary source of information adolescents identified were

other adolescent mothers.

In a survey conducted among 571 high school girls measuring their knowledge of breastfeeding the mean score out of a possible 20 was 12.8 (Pascoe, 1982). Cusson (1985) also found a high correlation between knowledge of breastfeeding and attitude toward breastfeeding: with increasing knowledge there was an increase in positive attitude.

In comparing breastfeeding practices and attitudes of adolescents with breastfeeding practices and attitudes of adults, the studies were often confounded by socioeconomic status. Baisch, Fox, Whitten and Pajewski (1989) controlled for SES by comparing low-income adolescents with low-income adults. The correlates identified in this study were infant feeding method of the mother or father, hearing about breastfeeding from a family member or friend, and race. Adult Caucasian mothers scored significantly higher on the attitude scale. When comparing black versus white among the adolescents only, the attitude scores were very similar. When comparing adolescents who attended a comprehensive intervention program, attitude scores were similar with the low-income adult population.

Friel, Hudson, Banoub, and Ross (1989) examined the impact of a multimedia campaign to determine how one might influence adolescents' attitudes toward breastfeeding. Attitude scores of those who saw the advertisement were higher than those who did not see the commercial. Other correlates identified with higher attitude scores were if the subject had been breastfed, if the subject's sibling had been breastfed or if breastfeeding had been mentioned in health classes at school.

Breastfeeding research among adolescents has focused primarily on correlates and predictors of infant feeding method choice. Some studies have identified factors that may influence the choice

process. The factors consistently identified with breastfeeding initiation and duration were maternal age, maternal support, race and knowledge.

Previous research clearly suggested benefits for older mothers and their infants with breastfeeding. Fewer studies have examined the impact or benefits of breastfeeding with a target sample such as adolescent mothers. Therefore, the influence breastfeeding may have on the mother-infant relationship among adolescent mothers remains unclear. Although trends favoring breastfed infants of adult mothers have been identified, behavioral measures of maternal caregiving, specifically components of mother-infant interaction and their association with breastfeeding were inconclusive among adult and adolescent mothers. The next section summarizes pertinent literature on maternal and infant interaction behaviors as they might be utilized to examine breastfeeding and maternal caregiving behavior.

Mother-Infant Interaction

The development of an early emotional bond between parent and child has been widely accepted as critical to optimal child development, (Sanders, 1962; Klaus & Kennell, 1976; Ainsworth, 1969; Bowlby, 1969) with studies identifying poorer cognitive performance and delayed social and language development in children who lack this bond (Clarke-Stewart, 1973; Beckwith, Cohen, Kopp, Parmelee, & Marcy, 1976). Researchers have examined this emotional relationship through mother-infant interaction (Isabella, Belsky, & von Eye, 1989; Young, 1988; Bakeman & Brown, 1980). The quality of early mother-infant interaction has been correlated with later child outcomes, such as cognitive development (Clarke-Stewart, 1973; Papousek & Papousek, 1977; Beckwith et al., 1976; de Chateau, 1980).

A persistent thread throughout the research is that of reciprocity or synchrony. Papousek and Papousek (1977) describe the interaction of a mother and her infant as a "chain" of interlocking behavioral patterns. Newson (1977) paints the picture of the mother setting up props to exercise the infant's interactional abilities. Brazelton, Koslowski, and Main (1974) describe a cycle of attention/nonattention as critical for effective mother-infant interaction. Stern (1974) describes a dyadic "turn-taking" with the mother basically providing continuous visual stimulus, but modifying the facial and vocal expressions as the infant shifts in and out of mutual gaze.

Whether one labels the significant element of mother-infant interaction reciprocity (Anderson & Sawin, 1983), reciprocal social transactions (Beckwith et al., 1976), or reciprocal interaction (Belsky, Taylor, & Rovine, 1984), the behaviors used to measure this emotional bond between mother and child have been numerous. Behaviors most consistently observed include responsiveness, amount and quality of vocalizations, amount and quality of physical contact, and amount and quality of visual contact (Belsky et al., 1984; Jones, Green, & Krauss, 1980; Osofosky & Danzger, 1974; Bakeman & Brown, 1980).

Behavioral Observations in Mother-Infant Interaction

Osofsky and Connors (1979) identified significant maternal behaviors that influence infant visual, auditory and tactile behaviors. They also found maternal auditory, visual and tactile stimulation related to infant responsiveness. Belsky, Taylor, and Rovine (1984) demonstrated the stability of maternal-infant gaze patterns and vocalizations, and maternal positive affect at one

month, three months, and nine months. Noble, Shafaie, and Self (1982) found significant variations in maternal vocalizations as a function of gaze aversion. Shafaie, Self, Noble, and Allen (1986) identified infant visual patterns as correlates and predictors of maternal verbal and tactile behaviors. Roggman and Peery (1989) found significant gender differences in visual and tactile behaviors within a play setting. Kuzela, Stifter, and Worobey (1990) found significant gender effects as well as significant feeding effects and a possible gender by feeding interaction effect upon maternal tactile and infant vocal behaviors.

In a literature review of mother-infant interaction, Osofsky and Connors (1979) presented infant and maternal characteristics and behaviors that influenced mother-infant interaction. Infant variables identified included: sex, birth order, and responsiveness to tactile, visual and auditory stimuli. Maternal characteristics and behaviors identified included: attitudes, SES, quantity and quality of visual, auditory and tactile stimulation, and responsiveness to infant behaviors. The critical element identified was not one or more specific behaviors or characteristics, but the "match" of mother to infant and infant to mother. Osofsky and Connors (1979) suggested the timing, the intensity and the modality of both mother and infant behavior evolved into a system or exchange that is organized together, involving mutual modification of behaviors.

Belsky, Taylor, and Rovine (1984) observed mother/infant dyads in the home at one month, three months, and nine months. Continuous behavioral observations were coded for frequency of nine maternal and four infant behaviors. These were collapsed into four a priori summary variables: reciprocal interaction, noninvolvement, distress,

basic care. The behaviors of most interest to the current study occurred within the summary variable labeled reciprocal interaction. This was measured by summing the frequencies of maternal vocalization, infant vocalization, maternal responsive vocalizations, maternal stimulate/arouse, infant respond/explore, three step interaction, infant looking at mother, maternal positive affect (mother smiling at, kissing or hugging baby), and maternal undivided attention. Consistency from one to nine months was significant for the summary variable, reciprocal interaction, even though behaviors within the construct varied. As maternal undivided attention decreased from one to three months, the infant respond/explore behaviors increased, as well as infant looking at mother and occurrences of three step interactions. From three to nine months maternal positive affect and infant vocalizations decreased, but significant increases in infant respond/explore behaviors were noted. The researchers proposed that the consistency of the construct and the changes of specific behaviors demonstrated the mother's adaptability to her developing infant.

Noble, Shafaie, and Self (1982) videotaped mothers interacting with their babies and used a continuous coding system to measure frequency and durations of eight behaviors within three different modalities. The same behaviors were observed for infants and mothers and were analyzed as visual, auditory or tactile. The behaviors that reached significance were initiations, action, monitor, terminations and off. All tapes were then coded for infant gaze aversion as defined by a clear termination of visual interaction greater than five seconds, initiated by the infant. All mothers exhibited more frequent and greater duration of vocal behaviors than tactile or visual behaviors. High gaze averting infants had mothers with lower

frequencies of all maternal behaviors within the visual modality. Interestingly, multiparous mothers exhibited high frequencies of rhythmical vocal behaviors exhibited by more vocal initiations, terminations and off behaviors than primiparous mothers. A significant sex difference was found with the most active and rhythmical in the vocal modality being the multiparous mothers with female high gaze averter infants. Conversely, male low gaze averters had mothers who exhibited the same pattern of maternal vocalizations but much less frequently.

Shafaie, Self, Noble, and Allen (1986) examined the relationship of early infant gaze aversion to maternal visual, auditory and tactile behaviors at one months, three months, and twelve months. They found that the frequencies of infant visual behaviors at two days predicted maternal verbal and tactile behaviors at twelve months. The high gaze averting infants at two days had mothers who offered less social tactile stimulation, and infants with more visual contact at two days had mothers with decreased frequency of "not talking" at twelve months. Maternal vocal and tactile behaviors at two days correlated with infant visual behaviors at twelve months. Mothers with increased duration of vocalizations at two days had infants with increased visual attentiveness at twelve months, while mothers with increased duration of maternal "not talking" at two days had infants with less visual contact and more gaze averting at twelve months. Mothers with more tactile stimulation offered through caregiving activities at two days had infants with less total visual contact and fewer visual initiations at twelve months.

Roggman and Peery (1989) observed the relationship of parental gazing and touching with infant gazing within a sample of 20, four-month-old infants and each of their parents, individually, resulting

in a total of 40 dyads. They found play interactions dependent upon parent and infant gender. Maternal tactile behavior was negatively correlated with infant gaze for boys, while paternal tactile behavior was also negatively correlated with infant gaze for male infants. However, the types of changes in touch differed between mother and father. Mothers increased frequency of touches as male infants averted gaze, while fathers increased duration of tactile contact in response to male gaze averters. There were no associations between tactile contact and female infant gaze patterns. There were also no correlations between paternal behaviors and other female infant behaviors, but maternal visual behavior was positively correlated with infant gaze if the infant was female. The researchers suggested that some of the behavioral differences identified as a function of gender may truly be interactive, implying it is too early to assume no gender effects in early social interaction studies.

Kuzela, Stifter, and Worobey (1990) observed 27 mother-infant dyads during a play episode. There were 14 male infants and 13 female infants with ages ranging from three to twelve months. The play episode was a free-play session with the baby and mother on a blanket on the floor. A basket of toys was also provided. Analysis was confined to only those maternal and infant behaviors identified as positive (versus neutral or negative). Maternal behaviors included play (whether the mother offered a toy, used a toy in a game, or played with the baby without a toy), touch (showing affection, soothing, touch with no intent, caregiving, forceful movement or manipulation of infant), vocalizations (mother vocalizes in response to infant movement or vocalization, mother initiates interaction, vocalizations not directed toward infant), and affect (positive, neutral or negative). Infant behaviors included affect

(infant smiling, laughing, etc., no apparent expression, irritable, distressed, full-blown cry), reaching or gazing behaviors (gazing or reaching toward mother, a toy or other object) and vocalizations (infant vocalizes in response to mother or not). Feeding method was determined by those currently breastfeeding and through a proportion score based on months breastfed/months old to control for those who had breastfed, but were no longer. Significant effects were found for feeding method and infant gender. Breastfeeding mothers touched their infants more frequently than the bottlefeeding mothers. An interaction effect revealed mothers of currently breastfed male infants and bottlefed females exhibited more positive affect than mothers of currently breastfed female infants and bottlefed male infants. Bottlefed infants vocalized more overall and displayed more contingent vocalizations as well. The breastfed infants were more irritable, but the researchers projected this fussing actually promoted more sensitive parenting by increasing the number of interactions between parent and infant.

These data presented us with several behaviors that have proven consistent and effective measures of mother-infant interaction. Vocal, visual and tactile behaviors of mother and infant have been examined in different situations across time and have survived statistical manipulation as valid correlates with later development. Infant gender and feeding method were also identified as factors necessary to consider. Next, the results of an effort to identify these factors and interaction behaviors within adolescent literature will be presented.

Adolescent Mother-Infant Interaction

A recent review of the literature revealed deficiencies in

adolescent mother-infant interaction when compared with adult mothers (Miller & Moore, 1990). It has been demonstrated that adolescent mothers are less responsive, have less physical contact, less verbalizations, less positive affect, and less eye-to-eye contact (Jones, Green, & Krauss, 1980; Levine, Coll, and Oh, 1985; Ruff, 1987; Coll, Hoffman, & Oh, 1987; Culp, Culp, Osofsky, & Osofsky, 1991).

Jones, Green, and Krauss (1980) serendipitously isolated maternal age as a variable for mothering readiness. Their subjects were 40 mothers aged 17 to 24 years of age from a lower socioeconomic background. Observations of maternal behaviors were conducted in two situations. During a physician examination of their infant, mothers were observed for the occurrences of seven behaviors including, behavioral responsiveness, verbal responsiveness to infant, and verbal responsiveness to physician. Infant distress was also noted. In a feeding session, behaviors examined were en face position of mother, lateral trunk contact, infant fondling by mother, and vocalization of mother. Behaviors were summed from five 30-second film clips for each situation. In addition, total behavior scores were derived from the sum of all behaviors in each situation. Analysis revealed significant differences in behaviors by maternal age with the younger mothers positioning themselves further away from their babies, holding their babies less closely during feedings, exhibiting fewer maternal behaviors, and responding less to their babies although their infants cried more than infants of mothers who were 21 years or older.

Levine, Coll and Oh (1985) examined the influence of child care support and ego development on mother-infant interactions. Behaviors of adolescent mother-infant pairs were compared with behaviors of

nonadolescent mother-infant pairs by videotaping a three minute interaction and a structured teaching situation. Maternal behaviors observed during the interaction situation were total frequency of verbalizations, amount of positive affect (number of smiles and kisses), mutual gaze (total number of seconds of eye-to-eye contact between mother and infant), and percent of contingency (total number of times mother responds to infant behavior, divided by the total number of infant behaviors). Maternal behaviors coded during the teaching situation included verbalizations, positive affect, shows objects, demonstrates tasks, and takes object away softly. Infant behaviors were observed only during interaction situation and included frequency of vocalizations, frequency of smiles, body movements, and distress. Only one difference between adolescent and nonadolescent maternal behavior was identified during the interaction situation: nonadolescent mothers showed significantly more positive affect toward their infants. Only one difference in infant behaviors reached significance as well: infants of nonadolescent mothers vocalized twice as much as infants of adolescent mothers. Verbalizations from adolescent mothers remained constant across both situations, but nonadolescent mothers increased vocalizations during teaching, resulting in significant differences in verbalizations for the teaching situation. Nonadolescent mothers demonstrated significantly more of all observed behaviors during the teaching situation.

Ruff (1987) analyzed adolescent maternal behaviors by comparing observations of a feeding situation in the hospital with a feeding situation six to twelve weeks later in the subject's home. Ruff used the Nursing Child Assessment Feeding Scale (NCAFS), which is a 76-item presence/absence scale. There are four maternal subscales

(sensitivity to cues, response to distress, social-emotional growth fostering, cognitive growth fostering) and two infant subscales (clarity of cues, responsiveness to parent). Adolescent mothers were found to be sensitive to their infant's cues and responsive to their infant's distress, but deficient in cognitive and social-emotional growth fostering. An improvement was noted in cognitive and social-emotional growth fostering at the twelve week assessment, but scores still remained lower than the comparison groups of adult mothers. Findings correlated with age and infant gender with older adolescent mothers of female infants having the highest scores.

Coll, Hoffman, and Oh (1987) used a two hour videotape in the subject's home to compare adolescent parenting and nonadolescent parenting. Maternal behaviors observed were: mother's proximity (near or far from infant), verbalization (positive or negative toward infant), physical contact (positive or negative), and activity (housework, caretaking, playing, etc.). Findings reaching significance included adolescents spent less time in caretaking activities, more time in positive contact and less time in positive verbalizations. After controlling for SES, adolescent mothers differed only in amount of time in positive vocalizations.

Culp, Culp, Osofsky, and Osofsky (1991) compared adolescent and nonadolescent maternal behaviors during feeding and play interactions with their six-month-old infants. Behaviors observed during the feeding were coded on a nine point scale and arranged into two a prior clusters. The expressiveness cluster included behaviors coded as expressiveness (no emotion communication to very much emotion communication to animated), expression of positive regard (none observed to continuous involvement in affectionate activities), attitude toward feeding (strong dislike to much enjoyment), delight

(absent to markedly frequent). The vocalizations cluster included frequency and quality of vocalization ratings. Maternal play behaviors were also coded on a nine point scale and included inventiveness, appropriateness, patience and attitude. Adolescent mothers were significantly less facially and verbally expressive, had a less positive attitude and showed less delight while interacting with their babies in a feeding situation. During the play situation, adolescent mothers were less inventive, less appropriate, less patient and had a less positive attitude toward their infants than did nonadolescent mothers.

Some researchers have taken issue with generalizations that adolescents have poor parenting skills, arguing variability in this population has led to the capable adolescent mothers being overlooked in the literature (Franklin, 1988; Lawrence, 1983). However, the assumption of poor parenting among adolescents appeared to have been so well-established that effort to identify characteristics and delineate differences between those adolescent mothers who were being responsive and synchronous with their babies from those adolescent mothers who were less responsive with their babies had been neglected.

Two exceptions to this approach were found in the work of Osofsky, Culp, and Ware (1988) and Melhuish (1989). Osofsky, Culp, and Ware (1988) noted that the outcome of the intervention varied according to how much cooperation, involvement and interest the adolescent displayed during the intervention. They used the subject's "personal investment" (involvement, cooperation and interest in intervention) to differentiate their adolescent subjects as "takers" versus "non-takers". The "takers" were those adolescents who kept more appointments, cooperated more with the home visitor and

attempted to apply more often the prescribed activities. The "non-takers" missed more appointments, interacted less with the home visitor and exhibited less interest and fewer attempts to act upon exercises or suggestions made through the intervention. Significant differences were identified in several interactive measures favoring the "takers" over the "non-takers".

Melhuish (1989) conducted a longitudinal study of mothers under 20 years of age for the purpose of identifying factors that might be associated with their children's developmental progress at 21 months of age. An interview instrument was designed to determine the mother's psychological state and feelings of satisfaction with motherhood. The Bayley Mental Development Index was used to measure the child's developmental progress. Female children scored significantly higher on the Bayley than did the male children. A significant correlation between child scores and the mother's satisfaction with motherhood was identified, leading the author to suggest that maternal psychological state, including maternal role satisfaction, might be a way to control the confounding variability in adolescent mothering research.

The current review revealed several behavioral measures of mother-infant interaction that have remained constant across time and situations. Feeding method and infant gender have been indicated as influencing variables. Microanalysis of mothering behaviors and examination of mother-infant behaviors as functions of feeding method were notably absent from the adolescent mother-infant interaction literature. This study attempted to document differences between breastfeeding and bottlefeeding adolescents in selected micro-components of mother-infant interaction, specifically visual behavior, verbalizations, physical contact and responsiveness as

measured by mutual gaze.

Chapter III

Statement of Purpose and Hypotheses

This chapter presents the statement of purpose based upon the preceding literature review. Major deficits were noted in the search of published studies. Microanalysis of adolescent mother-infant interaction was rarely undertaken. Adolescent mothers were grouped globally with little acknowledgement of, description of, or attention to, those adolescents who were mothering appropriately. Additionally, infant feeding method was rarely found as a factor in studies examining adolescent mothering.

Purpose

The primary purpose of this study was to identify if differences exist in mother-infant interaction among adolescents as a function of infant feeding method. A secondary purpose was to test the influence of infant gender on adolescent mother-infant interaction, as the evidence regarding impact of infant gender was inconclusive. In view of the absence of comparable data attempting to identify baseline behaviors among adolescent mothers, it was determined the emphasis of this study would be to document *any* differences. Consequently, the use of nondirectional hypotheses was justified, so as not to overlook differences in either direction.

Hypotheses

The hypotheses for this study fell into three categories which were stated as follows:

1. Infant feeding method will significantly influence maternal visual on-time (H_1), maternal verbal on-time (H_2), maternal tactile

on-time (H_3), and total maternal on-time (H_4) during play. Further, infant gender will significantly influence maternal visual on-time (H_5), maternal verbal on-time (H_6), maternal tactile on-time (H_7), and total maternal on-time (H_8) during play. Together, feeding method and infant gender will significantly influence maternal visual on-time (H_9), verbal on-time (H_{10}), tactile on-time (H_{11}), and total maternal contact (H_{12}) during play.

2. Infant feeding method will significantly influence infant visual on-time (H_{13}), infant verbal on-time (H_{14}), infant tactile on-time (H_{15}) and total infant contact (H_{16}) during play. Further, infant gender will significantly influence infant visual on-time (H_{17}), infant verbal on-time (H_{18}), infant tactile on-time (H_{19}), and total infant on-time (H_{20}) during play. Together, infant feeding method and infant gender will significantly influence infant visual on-time (H_{21}), verbal on-time (H_{22}), tactile on-time (H_{23}), and total infant on-time (H_{24}) during play.

3. Infant feeding method will significantly influence mutual gaze (H_{25}) during play. Infant gender will significantly influence mutual gaze (H_{26}) during play. Further, infant feeding method and infant gender will significantly influence mutual gaze (H_{27}) during play.

Chapter IV

Methodology

This chapter describes the methods and procedures used for collecting and analyzing the data. Following a description of how the subjects were selected, the process of identifying feeding groups will be discussed. The actual procedure of how the study was conducted and how coding was handled are presented to conclude this chapter.

Selection of Subjects

Subjects were primiparous adolescents whose infants ranged from nine to 16 weeks in age and were recruited from the Margaret Hudson School, an alternative program for pregnant and parenting adolescents in Tulsa, Oklahoma. There were a total of 56 mother-infant pairs who participated in the study. Mothers' ages ranged from 12-19 years of age, with a mean age of 17.16. Twelve subjects were deleted from the present study because of equipment malfunction and inadequate video data. Eleven subjects were dropped because of incomplete data or inability to schedule videotape session at a time when the infant would cooperate. One subject was eliminated because it was her second baby. Thirty-two mother-infant dyads formed the final sample for the current study.

Definition of Feeding Groups

One of the difficulties in reviewing the breastfeeding literature was the inconsistency of terminology. "Breastfeeding" in other studies included attempted breastfeeding to breastfeeding with supplements to exclusive breastfeeding. Many studies did not even

define what was meant by breastfeeding. In the current study only two subjects were exclusively breastfeeding at the time of their taping session. Therefore, feeding method was determined by a combination of when the infant was weaned, how many supplemental bottles the infant was given, and when supplemental bottles were started. Thus, the bottlefed group included those mothers who exclusively bottlefed as well as those mothers who weaned their babies from the breast at 2 weeks or less. The breastfed group consisted of mother-infant dyads which were still breastfeeding or did not wean before one month, even if the baby was receiving supplements. Among this group, the infants that were receiving supplements did not begin receiving regular supplements until the infant was approximately one month of age. There were no subjects that breastfed and weaned between two weeks and one month.

Collection of Data

Sessions took place on the campus of Margaret Hudson in Tulsa, Oklahoma. Subjects were fully informed of what they would be asked to do: to play with their baby, be videotaped, and be interviewed. Further, they were informed they could withdraw from the study at any time. All subjects signed an agreement of voluntary participation.

The infant was placed in an infant seat on a table at approximately eye level for the mother who sat in a chair at the table. Mothers were instructed to play with their baby as if they were in the play room or at home. Mothers were informed they may respond to any needs of the infant (i.e. feeding, diaper change, soothing) and that sessions would be terminated if they felt the need.

Mothers were instructed that toys and pacifiers were not to be

used. If mothers had difficulty understanding how to play with their infant without toys they were instructed to play with their baby as if they were waiting somewhere and they just didn't happen to have any toys with them.

Play sessions were recorded using two cameras, one on the mother and one on the infant, with images combined into split screen format through a special effects generator and a cordless microphone which was attached to the mother's garments. After the video recording of play, there was a brief background interview to ascertain pregnancy and delivery history, infant feeding history, income level, marital status and other demographic data. Maternal responses were verified when possible by registered nurses who served as school health personnel and case managers for all clients of Margaret Hudson.

At the end of the session the researcher thanked the mother and offered to make a video of the baby as a gift. Any questions or concerns of the mother were addressed at this time.

Codification of Data

Sessions varied in length but for uniformity of data, videos were coded for only nine minutes, using the nine minutes in which the infant was most cooperative. The videos were coded for total durations with the use of Eventlog/Logdata, a special software package designed for use in recording real-time events (Henderson, 1989). Coders observed for the following behaviors: maternal visual, verbal and tactile contact, and infant visual, verbal and tactile contact, and mutual gaze. Maternal total contact and infant total contact were derived by adding together total duration for visual, verbal and tactile on time.

The term on-time was chosen to mean the total duration in

seconds of contact or stimulation from any given modality. Maternal visual on-time was coded as the total amount of time in seconds the mother was looking at the baby. Maternal verbal on-time was coded as the total amount of time the mother was talking or making any verbal sounds towards the baby. Maternal tactile on-time was coded as the total amount of time the mother was touching or in physical contact with the baby. Any segments of time where the mother was feeding, changing, or burping the baby were excluded from coding.

Infant visual on-time was coded as the total amount of time the baby was looking at the mother. Infant verbal on-time was coded as the total duration of any infant vocalizations, excluding fussing or crying. Infant tactile on-time referred to the total amount of time of any tactile contact the infant made with the mother where the infant was holding on, touching or stroking the mother with an open palm or foot. Mutual gaze on-time was coded as the total amount of time the mother and baby had eye-to-eye contact.

Coders were trained from a subset of videos and reliability for all measures was ascertained before coding began. To assure consistency of reliability checks were made from an additional subset of videos upon completion of coding. In the beginning of the study, a subset of 4 subjects were used and reliability ranged from 87% to 98% across modalities. Upon completion, reliability was tested among a subset of 4 subjects from the study and ranged from 90% to 99% across modalities. Specific reliabilities for each modality can be found in Table 1.

TABLE 1

Inter-Coder Reliabilities

Modalities	*Beginning of Coding (n=4)*	*End of Coding (n=4)*
Maternal		
Visual	90% to 92%	95% to 99%
Vocal	88% to 97%	93% to 98%
Tactile	96% to 98%	90% to 98%
Infant		
Visual	87% to 94%	91% to 96%
Vocal	90% to 94%	91% to 95%
Tactile	92% to 98%	91% to 93%
Mutual Gaze	91% to 96%	96% to 97%

Chapter V
Results and Analyses

The results are presented in several sections. First, the demographic characteristics of the sample will be presented, followed by descriptive data of the dependent measure. The statistical analyses directly addressing the proposed hypotheses concludes the chapter.

Demographic Characteristics of the Sample

The sample was made up of 32 primiparous adolescent mother-infant dyads. Eighteen of the mothers were Caucasian, 13 mothers were African American and 1 mother was Native American. Maternal age ranged from 12 to 19 years with a mean age of 16.74 years (SD 1.49 years). Infant ages ranged from 63 days to 116 days with a mean age of 81.88 days (SD 12.6 days). There were seventeen male infants and fifteen female infants.

Seventeen of the subjects were supported by their parents. The remaining fifteen subjects supported themselves, were supported by their partner or relative other than their parents, or they received AFDC, SSI or some other form of government support. Nine of the fourteen subjects who were aware of their income level indicated they lived on less than $15,000 per year. Table 2 presents a complete breakdown of demographic information.

Twenty-four of these adolescent mothers had vaginal deliveries and eight had cesarean sections. There were eighteen mothers who had no anesthesia or only a local for an episiotomy, while fourteen mothers had an epidural, spinal block or general anesthesia. The reported complications of labor and delivery were those events that

led to cesarean deliveries, forceps delivery, or some type of maternal infection. The infants were healthy at birth being admitted to normal newborn nurseries and being discharged from the hospital with the mother. The infant birth weights ranged from five pounds twelve ounces (2608 grams) to ten pounds one ounce (4564 grams) with a mean weight of seven pounds five ounces (3338 grams, SD 464 grams). Table 3 demonstrates the distribution of infant birth weight by race, infant gender and feeding method.

Sixteen mothers never attempted to breastfeed their baby although another sixteen mothers attempted breastfeeding. Three of the sixteen mothers that attempted breastfeeding weaned their baby at two weeks of age or less, with one of these moms exclusively breastfeeding for those two weeks and the other two moms supplementing by providing four or more bottles per day during the attempted breastfeeding. Table 4 reveals the detailed breakdown of feeding history.

TABLE 2

Characteristics Of Subjects

Characteristic	*Number of Subjects (n=32)*
Maternal Variables	
Race	
Caucasian	18
African American	13
Native American	1
Age	
12 to 15 years	9
16 to 17.5 years	14
17.6 to 19 years	9
Income Level	
Unknown	18
< $15,000	9
$15,001 to $25,000	3
$25,001 to $40,000	2
Income Source	
Independent	1
Partner	8
Parent	17
Other Relative	1
AFDC, SSI, or other state support	5
Marital Status	
Single	17
Married	5
Separated	2
Living Together	4
Engaged	4
Type Delivery	
Vaginal	24
Cesarean	8
Type Anesthesia	
None	11
Local	7
Epidural	10
Spinal	1
General	3
Infant Variables	
Gender	
Male	17
Female	15
Feeding Method	
Breast	13
Bottle	19

TABLE 3

Infant Birth Weight Examined by Varying Factors

Factor	*Birth Weight*
Complete Sample (n=32)	3337.63 (463.6)
Race	
Caucasian (n=18)	3416.22 (527.6)
African/Native American (n=14)	3236.57 (359.1)
Maternal Age	
12-15 yrs. (n=9)	3308.00 (427.2)
16-17.5 yrs. (n=14)	3220.21 (433.7)
17.6-19 yrs. (n=9)	3549.89 (518.6)
Infant Gender	
Male (n=17)	3389.06 (430.2)
Female (n=15)	3279.33 (507.5)
Feeding Method	
Breast (13)	3284.53 (434.5)
Bottle (19)	3415.23 (511.0)

Note. All weights reported in grams as Mean(SD).

TABLE 4

Feeding History

Variable	*Number of Subjects*
What Infant Eats (n=32)	
Formula Only	2
Formula and Water	3
Formula and Cereal	3
Formula and Juice	3
Formula, Juice, Cereal and Other Baby Food	11
Formula and Breast	3
Breast Only	3
Breast and Water	1
Breast, Formula and Water	1
Breast, Formula and Cereal	2
Ever Breastfed (n=32)	
Never	16
Yes, But Not Now	6
Only Breastfed	2
Breast and Bottle	8
If Breastfed, Ever Received Bottle (n=16)	
Yes	14
No	18
If Breastfed, When Received First Bottle (n=14)	
In hospital	5
Within 1st Week	3
2-4 Weeks	4
5-7 Weeks	2
How Many Bottles Received (n=14)	
Less than 1 per Week	2
1-3 per Week	6
1 per Day	1
2-4 per Day	3
More than 4 per Day	2
Weaned (n=16)	
Yes	7
No	8
In Process	1
When Weaned (n=7)	
1 Week or Less	2
2-4 Weeks	1
5-7 Weeks	1
2 Months	2
Between 2 Months and Date of Session	1

Descriptive Data

Means and standard deviations for the dependent variables are found in Table 5 through Table 7. Table 5 furnishes the means and standard deviations for the maternal variables; Table 6 presents the means and standard deviations for the infant variables; and Table 7 gives the means and standard deviations for mutual gaze.

These tables demonstrate the variability among the sample. For example, if you look at Table 5, bottlefed infants appeared to experience more maternal visual on time with less variability, while mothers who breastfed talked more to their babies. Maternal tactile behaviors appeared to change according to infant gender with mothers touching breastfed female infants and bottlefed male infants more. Total maternal contact appeared to be most stable among female infants who were breastfed. In Tables 5 and 6, variability continues, but in completely different categories. Therefore, patterns or differences in behaviors were non-distinguishable in the dependent variables.

TABLE 5

Maternal Behaviors - Infant Gender and Feeding Method

Group	*Duration Maternal Looking*	*Duration Maternal Vocal*	*Duration Maternal Tactile*	*Total Maternal Contact*
Females				
Breast	482.4	316.1	404.6	1203
(n=7)	(55.6)	(82.7)	(76.3)	(53)
Bottle	507.3	300.8	409.5	1218
(n=8)	(45.2)	(111.3)	(118.6)	(113)
Males				
Breast	502.0	320.8	353.0	1176
(n=6)	(44.7)	(40.9)	(159.3)	(159)
Bottle	506.8	313.1	430.0	1250
(n=11)	(40.9)	(121.2)	(126.0)	(186)

Note. All durations are reported in seconds as Mean (SD).

TABLE 6

Infant Behaviors - Infant Gender and Feeding Method

Group	*Duration Infant Looking*	*Duration Infant Vocal*	*Duration Infant Tactile*	*Total Infant Contact*
Females				
Breast	369.3	70.1	95.0	534
(n=7)	(125.1)	(38.3)	(59.9)	(142)
Bottle	329.9	72.6	151.4	554
(n=8)	(92.3)	(29.4)	(96.7)	(130)
Males				
Breast	317.0	79.7	148.8	546
(n=6)	(61.9)	(50.1)	(112.8)	(100)
Bottle	299.1	98.1	121.3	518
(n=11)	(130.2)	(69.9)	(59.6)	(188)

Note. All durations are reported in seconds as Mean (SD).

TABLE 7.

Mutual Gaze - Infant Gender and Feeding Method

Group	*Duration Mutual Gaze*
Females	
Breast (n=7)	148 (100)
Bottle (n=8)	132 (66)
Males	
Breast (n=6)	136 (74)
Bottle (n=11)	142 (77)

Note. All durations reported in seconds as Mean (SD).

Statistical Analyses of Data

The hypotheses were tested by multivariate analysis of variance (MANOVA) of maternal and infant on-time in each modality as functions of feeding method, infant gender, and as an interaction of feeding method and infant gender. The findings for each hypothesis follow. In general, no significant findings were noted.

The first multivariate analysis of variance (MANOVA) analyzed maternal variables as a function of feeding method, infant gender and feeding method by infant gender as independent measures. H_1 tested the hypothesis that feeding method would significantly influence maternal visual on-time; data did not support this hypothesis. No significant differences in maternal visual on-time were found by feeding method, $F(1, 28)=.77$, $p > 0.39$. H_2 tested the hypothesis that feeding method would significantly influence maternal verbal on-time; data did not support this hypothesis. No significant differences in maternal verbal on-time were found in accordance of

feeding method, $F\ (1, 28)=.10$, $p > 0.75$. H_3 tested the hypothesis that feeding method would significantly influence maternal tactile on-time; data did not support this hypothesis. No significant differences in maternal tactile on-time were found as a result of feeding method, $F\ (1, 28)=.88$, $p > 0.36$. H_4 tested the hypothesis that feeding method would significantly influence total maternal on-time; data did not support this hypothesis. No significant differences in total maternal on-time were found in relation to feeding method, $F\ (1, 28)=.74$, $p > 0.40$.

H_5 tested the hypothesis that infant gender would significantly influence maternal visual on-time; data did not support this hypothesis. No significant differences in maternal visual on-time were found in accordance with infant gender, $F\ (1, 28)=.33$, $p > 0.57$. H_6 tested the hypothesis that infant gender would significantly influence maternal verbal on-time; data did not support this hypothesis. No significant differences in maternal verbal on-time were found as a result of infant gender, $F\ (1, 28)=.05$, $p > 0.83$. H_7 tested the hypothesis that infant gender would significantly influence maternal tactile on-time; data did not support this hypothesis. No significant differences in maternal tactile on-time were found by infant gender, $F\ (1,28)=.01$, $p > 0.92$. H_8 tested the hypothesis that infant gender would significantly influence total maternal on-time; data did not support this hypothesis. No significant differences in total maternal on-time were found as a result of infant gender, $F\ (1, 28)=.06$, $p > 0.80$.

H_9, H_{10}, H_{11}, and H_{12} tested the hypotheses that together feeding method and infant gender would significantly influence maternal visual on-time, maternal verbal on-time, maternal tactile on-time and total maternal on-time, respectively; data did not support these

hypotheses. No significant differences in maternal visual on-time, maternal verbal on-time, maternal tactile on-time and total maternal on-time were found as a result of feeding method and infant gender, $F(1,28)=.36$, $p > 0.56$; $F(1, 28)=.01$, $p > 0.92$; $F(1,28)=.66$, $p > 0.42$; $F(1, 28)=.33$, $p > 0.57$, consecutively.

The second multivariate analysis of variance (MANOVA) analyzed infant variables as a function of feeding method, infant gender and feeding method by infant gender as independent measures. H_{13} tested the hypothesis that feeding method would significantly influence infant visual on-time; data did not support this hypothesis. No significant differences in infant visual on-time were found in accordance with feeding method, $F(1, 28)=.69$, $p > 0.41$. H_{14} tested the hypothesis that feeding method would significantly influence infant verbal on-time; data did not support this hypothesis. No significant differences in infant verbal on-time were found in relation to feeding method, $F(1, 28)=.47$, $p > 0.50$. H_{15} tested the hypothesis that feeding method would significantly influence infant tactile on-time; data did not support this hypothesis. No significant differences in infant tactile on-time were found as a result of feeding method, $F(1, 28)=.23$, $p > 0.63$. H_{16} tested the hypothesis that feeding method would significantly influence total infant on-time; data did not support this hypothesis.. No significant differences in total infant on-time were found by feeding method, $F(1, 28)=.01$, $p > 0.91$.

H_{17} tested the hypothesis that infant gender would significantly influence infant visual on-time; data did not support this hypothesis. No significant differences in infant visual on-time were found by infant gender, $F(1, 28)=1.01$, $p > 0.32$. H_{18} tested the hypothesis that infant gender would significantly influence infant

verbal on-time; data did not support this hypothesis. No significant differences in infant verbal on-time were found as a result of infant gender, $F\ (1, 28)=1.03$, $p > 0.32$. H_{19} tested the hypothesis that infant gender would significantly influence infant tactile on-time; data did not support this hypothesis. No significant differences in infant tactile on-time were found in accordance with infant gender, $F\ (1, 28)=.02$, $p > 0.88$. H_{20} tested the hypothesis that infant gender would significantly influence total infant on-time; data did not support this hypothesis. No significant differences in total infant on-time were found in relation to infant gender, $F\ (1, 28)=.09$, $p > 0.77$.

H_{21}, H_{22}, H_{23}, and H_{24} tested the hypotheses that together feeding method and infant gender would significantly influence infant visual on-time, infant verbal on-time, infant tactile on-time and total infant on-time, respectively; data did not support these hypotheses. No significant differences in infant visual on-time, infant verbal on-time, infant tactile on-time and total infant on-time were found as a result of feeding method and infant gender, $F\ (1, 28)=.07$, $p > 0.79$; $F\ (1, 28)=.18$, $p > 0.68$; $F\ (1, 28)=2.02$, $p > 0.17$; $F\ (1, 28)=.18$, $p > 0.68$.

The final analysis of variance (ANOVA) analyzed mutual gaze as a function of feeding method, infant gender and feeding method and infant gender. H_{25} tested the hypothesis that feeding method would significantly influence mutual gaze; data did not support this hypothesis. No significant differences in mutual gaze were found by feeding method, $F\ (1,28)=.03$, $p > 0.87$. H_{26} tested the hypothesis that infant gender would significantly influence mutual gaze; data did not support this hypothesis. No significant differences in mutual gaze were found by infant gender, $F\ (1, 28)=.0003$, $p > 0.98$.

The final hypothesis, H_{27}, tested the hypothesis that together feeding method and infant gender would significantly influence mutual gaze; data did not support this hypothesis. No significant differences in mutual gaze were found as a result of feeding method and infant gender, $F\ (1, 28) = .15$, $p > 0.70$.

Chapter VI
Discussion and Summary

This study revealed no differences in mother-infant interaction among adolescents as a function of feeding method. Furthermore, there were no differences in maternal or infant visual, verbal or tactile behaviors in accordance with feeding method. Finally, these results showed no significant differences in social interactions of the adolescent mother and infant as an interaction effect of feeding method and infant gender.

Several studies have identified favorable benefits in social and cognitive development as a function of feeding method (Morrow-Tlucak et al., 1988; Taylor & Wadsworth, 1984; Fergusson et al., 1982). Other studies have documented differences in mothering behaviors between breastfeeding and bottlefeeding mothers (Kuzela et al., 1990; Dunn & Richards, 1977). Yet, in the present study no significant differences in social interactions were identified in accordance with feeding method. Contrasts among the studies, however, were apparent in several areas.

First, the research examining influence of feeding method was difficult to compare because of divergent definitions of breastfeeding. In the current study, feeding group placements included consideration of exclusive breastfeeding, supplemental feedings, age of infant at supplement onset, and number of supplements. However, breastfeeding in the literature was most often defined by duration, the length of calendar time breastfed. A common value applied to this measure has been greater than or less than a four month duration (Fergusson et al., 1982; Morrow-Tlucak et al., 1988; Taylor & Wadsworth, 1984; Kovar et al., 1984). Kuzela et al.

(1990) differentiated feeding method by "currently breastfed". Few of these researchers addressed the issue of supplemental feedings. There is no way to know if these breastfed infants were exclusively breastfed, received supplemental bottles, cereal or other food. Recent findings indicated that supplemental feedings did not change the significance of identified breastfeeding benefits if the supplements were not begun before 13 weeks (Howie et al., 1990). As discussion regarding breastfeeding benefits increased in the literature, it became more apparent researchers needed to thoroughly and specifically define "breastfeeding" for readers to know how to interpret the results accurately (Howie et al., 1990; Mulford, 1990).

Another issue taken into consideration was the child's age at the time of measurement. Many of the studies that identified positive benefits of breastfeeding were examining results in older infants and children (Menkes, 1977; Fergusson et al., 1982; Taylor & Wadsworth, 1984). Morrow-Tlucak et al. (1988) attempted to identify benefits in six-month-old infants. Although a trend favoring breastfed infants was identified at six months, it did not reach significance until one year of age. Kuzela et al. (1990) identified benefits of breastfeeding in a sample of infants whose ages ranged from three months to twelve months with the mean age being eight months. Howie et al. (1990) identified breastfeeding benefits with the age of significance being 13 weeks. The current study sample examined infants ranging from nine weeks to 16 weeks with a mean age of 12 weeks. It may be that the benefits of breastfeeding were not as noticeable in this young sample. As was stated earlier, thirteen weeks was the earliest age, prior to this study, associated with significant differences in accordance with feeding method (Howie et al., 1990). The ages involved in the current study may have been so

young and provided such a small window on development that differences were not yet strong enough to reach significance.

Other methodological variations may have contributed to the contrasting nature of the findings. The studies examining social and cognitive development were generally conducted outside of the United States. In addition, these studies used retrospective interviews and questionnaires (Menkes, 1977; Rodgers, 1978; Fergusson et al., 1982; Taylor & Wadsworth, 1984; Morrow-Tlucak et al., 1988). Incorporation of global measures indicated positive benefits associated with breastfeeding, but in the present study the use of microanalysis revealed no significant differences in social interactions in accordance with feeding method.

Similarly, even within a particular culture such as the United States, differences in socioeconomic status might elicit varying results. Past research has suggested a relationship between socioeconomic status and choice of infant feeding method among adult women, but not among adolescents (Ryan et al., 1991; Fergusson et al., 1982; Joffe & Radius, 1987; Yoos, 1985). Since socioeconomic status is dependent on age and education the association of this variable with choice of infant feeding method appears less confounding among adolescents.

Results of the current study were also in contrast to other studies with regard to infant gender. Several studies reported differences in maternal and infant behaviors by infant gender (Kuzela et al., 1990; Roggman and Peery, 1989; Noble, Shafaie, and Self, 1982; Osofsky, and Connors, 1979), but many have not (Belsky, Taylor, and Rovine, 1984; Shafaie, Self, Noble, and Allen, 1986;). The current study did not find significant effects as a function of infant gender, although several of the means were suggestive of such

effects. The largest mean difference (and closest to reaching significance) were those in the tactile realm. Infant tactile behavior approached significance (P=0.17) as an interaction effect of infant gender and feeding method, with male bottlefed infants touching their mothers more. Other differences that suggested the interaction of feeding method and gender influence included: breastfeeding mothers touched their female infants more, with mothers of bottlefed male infants more similar than mothers of bottlefed females or breastfed males; infant behaviors revealed bottlefed female infants vocalized more while breastfed male infants looked at their mothers more; bottlefed male infants touched their mother more; and the bottlefed female infants had the longest duration of mutual gaze.

Another definitional difference may illuminate divergent results in the tactile realm. The present study defined maternal tactile contact as any and all physical contact of the mother with the infant. Many of the mothers used a monitoring type touch, having physical contact with the infant throughout the session. Most studies have differentiated between the types of touch, such as monitoring, caregiving, or interactional touch (Kuzela et al., 1990; Shafaie et al., 1986; Noble et al., 1982). This differentiation in touch appears to be more sensitive in measuring tactile behaviors. In spite of the suggestion of Kuzela et al., (1990) and despite the suggestion of an interaction effect, the two variables of feeding method and infant gender did not have a significant impact in the current study. These varying results in regards to infant gender suggest a degree of fragility in differences that are identified by gender. Although, it is an interesting variable to examine and significant influences have been documented, the results seem to vary

dependent on procedures, location and sample. Given that the trends in these data were in the direction of differences in accordance with gender, and the fact that others have found gender differences, the continuing inclusion of infant gender as a variable in infant research would appear appropriate.

Demographic Issues

Much of the research has contrasted adolescent mothers with adult mothers. Many have claimed differences in maternal behaviors according to maternal age, with behaviors improving as the mothers aged (Jones et al., 1980; Levine et al., 1985; Culp et al., 1991). In the current study the amount of identified variability led to examination of maternal age. The subjects were divided into a three way split for maternal age and means of dependent variables were compared (Appendix B). Clearly, when comparing adolescent mothers with only adolescent mothers the age differences were not as apparent. The more favorable and stable trends were noted among the median age group rather than the oldest age group.

Some studies have indicated race differences in maternal behaviors (Fergusson et al., 1982; Morrow-Tlucak et al., 1988). Means of all duration variables were arranged by race, feeding method, and infant gender and compared (Appendix B). The variability persisted with few notable differences from the previous results.

Descriptive Issues

In the current study, the mean differences appeared large, but because of variability the differences were nonsignificant. Surprisingly, in some of the variables, the standard deviation was almost or more than half of the mean value. While such variability

is common in infant research, these dyads exhibited even greater variability than expected. Other researchers have noted this occurrence of "more than expected variability" among adolescent mothers (Culp, Applebaum, Osofsky, and Levy, 1988), and have suggested that statistical analysis based upon the use of the mean may not be appropriate when conducting research among adolescents. However, the variability within the current study appeared important as it characterized this sample of adolescent mother-infant dyads and contradicted the assumption of improvement and stabilization maternal behaviors with increasing age among adolescent mothers. The least variability was found not in the oldest age group (17.6 to 19 years), but in the median age group (16 to 17.5 years).

Implications

The large amount of variability among adolescent maternal behaviors certainly indicate caution against using broad generalizations or groupings of adolescents in research. If such groupings are to be made, then attempts must be made to identify more effective characterizations of adolescent mothers. In a promising vein, descriptive characterization using psychological state and mothering role satisfaction (Melhuish, 1989) or maturity and ego development (Levine et al., 1985) offer possible alternatives for differentiation.

This study suggests that microanalysis may assist researchers. When examining these data in light of other microanalytical studies (Noble et al., 1982; Shafaie et al., 1986) it appears the realms of infant tactile behavior and mutual gaze may be the most sensitive microanalytical indicators among adolescent mother-infant dyads. In that regard, microanalysis may help to identify those adolescents who

are exhibiting responsive and appropriate mothering behaviors in order to emphasize the positive characteristics of these dyads. Another body of literature indicates that maternal knowledge, satisfaction, and confidence can be influenced by enhancing the interactions between mother and infant (Golas & Parks, 1986; Arco, DeMeis, Self, and Gutrecht, 1984; Perry, 1983; Worobey and Belsky, 1982). Microanalysis provides a key to unlock the specifics of those behaviors that may strengthen the relationship of the adolescent mother and her infant.

REFERENCES

Ainsworth, M. D. S. (1969). Object relations, dependency, and attachment: A theoretical review of the infant-mother relationship. Child Development, 40, 969-1025.

American Academy of Pediatrics Committee on Nutrition. (1980). Encouraging breastfeeding. Pediatrics, 65(3), 657-658.

American Academy of Pediatrics Committee on Nutrition. (1992). The use of whole cow's milk in infancy. Pediatrics, 89, 1105-1109.

Anderson, C., & Sawin, D. (1983). Enhancing responsiveness in mother-infant interaction. Infant Behavior and Development, 6, 361-368.

Arco, C. M. B., DeMeis, D. K., Self, P. A., & Gutrecht, N. (1984). Interrelationships among maternal and infant characteristics during the neonatal period. Journal of Pediatric Psychology, 9, 131-147.

Baisch, M. J., Fox, R., Whitten, E., & Pajewski, N. (1989). Comparison of breastfeeding attitudes and practices: Low-income adolescents and adult women. Maternal-Child Nursing, 18, 61-71.

Bakeman, R., & Brown, J. (1980). Early interaction: Consequences for social and mental development at three years. Child Development, 51, 437-447.

Bauchner, H., Leventhal, J. M., & Shapiro, E. (1986). Studies of breastfeeding and infections: How good is the evidence? Journal of the American Medical Association, 256,887-892.

Becker, P. (1987). Sensitivity to infant development and behavior: A comparison of adolescent and adult single mothers. Research in Nursing and Health, 10, 119-127.

Beckwith, L., Cohen, S., Kopp, C., Parmelee, A., & Marcy, T. (1976). Caregiver-infant interaction and early cognitive development in preterm infants. Child Development, 47, 579-587.

Belsky, J., Taylor, D., & Rovine, M. (1984). The pennsylvania infant and family development project, II: The development of reciprocal interaction in the mother-infant dyad. Child Development, 55, 706-717.

Biegelson, D., Cowell, C., & Goldberg, D. (1986). Breastfeeding practices in a low-income population in New York City: A study of selected health department child health stations. Journal of American Dietetic Association, 86, 90-91.

Bowlby, J. (1969). Attachment and loss. New York: Basic Books.

Brazelton, T. B., Koslowski, B., & Main, M. (1974). The origins of reciprocity: The early mother-infant interaction. In Michael Lewis & Leonard Rosenblum (Eds.), The Effect of the Infant on Its Caregiver (pp. 49-76). New York: John Wiley & Sons.

Chan, G., Ronald, N., Slater, P., Hollis, J., & Thomas, M. Rita.

(1982). Decreased bone mineral status in lactating adolescent mothers. Journal of Pediatrics, 101, 767-770.

Chilman, C. (1980). Social and psychological research concerning adolescent childbearing: 1970-1980. Journal of Marriage and the Family, 42, 793-805.

Clarke-Stewart, K. A. (1973). Interactions between mothers and their young children: Characteristics and consequences. Monographs of the Society for Research in Child Development, 38(6-7, Serial No. 153).

Coll, C., Hoffman, J., & Oh, W. (1987). The social ecology and early parenting of caucasian adolescent mothers. Child Development, 58, 955-963.

Correil, J., & Murphy, J. (1988). Maternal commitment, lactation practices and breastfeeding duration. Journal of Gynecologic and Neonatal Nursing, 17, 273-278.

Culp, R., Appelbaum, M., Osofsky, J., & Levy, J. (1988). Adolescent and older mothers: Comparison between prenatal and maternal variables and newborn interaction measures. Infant Behavior and Development, 11, 353-362.

Culp, R., Culp, A., Osofsky, J., & Osofsky, H. (1991). Adolescent and older mothers interaction with their six month old infants. Journal of Adolescence, 14, 195-200.

Cunningham, A. (1983). Bone mineral loss in lactating adolescents. Journal of Pediatrics, 102, 1016-1017.

Cusson, R. (1985). Attitudes toward breastfeeding among female high-school students. Pediatric Nursing, 11(3), 189-191.

de Chateau, P. (1980). Parent-neonate interaction and its long-term effects. In E. Simmel (Ed.), Early Experiences and Early Behavior: Implications for Social Development (pp. 109-179). New York: Academic Press.

Dunn, J.B., & Richards, M. P. M. (1977). Observations on the developing relationship between mother and baby in the neonatal period. In H.R. Schaffer (Ed.), Studies in Mother-Infant Interaction (pp. 427-455). London: Academic Press.

Executive summary of task force on infant feeding practices. (1984). Pediatrics, 74, 579-590.

Fergusson, D. M., Beautrais, A. L., & Silva, P. A. (1982). Breastfeeding and cognitive development in the first seven years of life. Social Science Medicine, 16, 1705-1708.

Fomon, S., & Filer, L. J. (1974). Milks and formulas. In Samuel (Ed.), Infant Nutrition (pp. 359-385). Philadelphia: W.B. Saunders Company.

Franklin, D. (1988). The impact of early childbearing on developmental outcomes: The case of black adolescent parenting.

Family Relations, 37, 268-274.

Friel, J., Hudson, N., Banoub, S., & Ross, A. (1989). The effect of a promotion campaign on attitudes of adolescent females towards breastfeeding. Canadian Journal of Public Health, 80, 195-199.

Furstenberg, F., Jr. (1976). Unplanned parenthood: The social consequences of teenage childbearing. New York: Free Press.

Furstenberg, F., Jr. (1991). As the pendulum swings: Adolescent childbearing and social concern. Family Relations, 40, 127-138.

Gielen, A., Faden, R., O'Campo, P., Brown, C. H., & Paige, D. (1991). Maternal employment during the early postpartum period: Effects on initiation and continuation of breast-feeding. Pediatrics, 87, 298-305.

Golas, G., & Parks, P. (1986). Effect of early postpartum teaching on primiparas' knowledge of infant behavior and degree of confidence. Research in Nursing and Health, 9, 209-214.

Goldman, A., Atkinson, S., & Hanson, L. (Eds.). (1987). Human lactation 3: The effects of human milk on the recipient infant. Proceedings of the International Conference on the Effects of Human Milk on the Recipient Infant. New York: Plenum Press.

Grossman, L., Larsen-Alexander, J., Fitzsimmons, S., & Cordero, L. (1989). Breastfeeding among low-income, high-risk women. Clinical Pediatrics, 28(1), 38-42.

Henderson, R. (1989). Eventlog/Logdata (1992 update) [Computer program and manual]. Iowa City, Iowa: Conduit, The University of Iowa.

Howie, P., Forsyth, J., Ogston, S., Clark, A., & du V Florey, C. (1990). Protective effect of breast feeding against infection. British Medical Journal, 300, 11-16.

Isabella, R., Belsky, J., & von Eye, A. (1989). Origins of infant-mother attachment: An examination of interactional synchrony during the infant's first year. Developmental Psychology, 25(1), 12-21.

Jacobson, S., Jacobson, J., & Frye, K. (1991). Incidence and correlates of breast-feeding in socioeconomically disadvantaged women. Pediatrics, 88, 728-736.

Jelliffe, D. & Jelliffe, E. F. P. (1978). Human Milk in the Modern World. London, England: Oxford University Press.

Joffe, A., & Radius, S. (1987). Breast vs. bottle: Correlates of adolescent mothers infant feeding practices. Pediatrics, 79(5), 689-695.

Jones, F., Green, V., & Krauss, D. (1980). Maternal responsiveness of primiparous mothers during the postpartum period: Age differences. Pediatrics, 65(3). 579-584.

Kennell, J., & Klaus, M. (1979). Early mother-infant contact: Effects on breastfeeding. In Dana Raphael (Ed.), Breastfeeding and Food Policy in a Hungry World (pp. 199-209). New York: Academic Press, Inc.

Kennell, J., Voos, D., & Klaus, M. (1979). Parent-infant bonding. In Joy Osofsky (Ed.), Handbook of Infant Development (pp. 786-798). New York: John Wiley & Sons, Inc.

Klaus, M., & Kennell, J. (1976). Maternal-infant bonding. St. Louis: The C.V. Mosby Co.

Koop, C. E. (1984). Breastfeeding: The community norm. Public Health Report, 99, 550-558.

Kovar, M., Serdula, M., Marks, J., & Fraser, D. (1984). Review of the epidemiologic evidence for an association between infant feeding and infant health. Pediatrics, 74, 615-638.

Kurinj, N., Shiono, P., & Rhoads, G. (1988). Breastfeeding incidence and duration in black and white women. Pediatrics, 81(3), 365-371.

Kuzela, A., Stifter, C., & Worobey, J. (1990). Breastfeeding and mother-infant interactions. Journal of Reproductive and Infant Psychology, 8, 185-194.

Lawrence, R. (1983). Early mothering by adolescents. In Elizabeth McAnarney (Ed.), Premature Adolescent Pregnancy and Parenthood (pp. 207-218). New York: Grune & Stratton.

Lawrence, R. (1989). Breastfeeding: A guide for the medical profession (3rd ed.). St. Louis: The C.V. Mosby Company.

Levine, L., Coll, C., & Oh, W. (1985). Determinants of mother-infant interaction in adolescent mothers. Pediatrics, 75(1), 23-29.

Lipsman, S., Dewey, K., & Lonnerdal, B,. (1985). Breastfeeding among adolescent mothers: Milk composition, infant growth, and maternal dietary intake. Journal of Pediatric Gastroenterology and Nutrition, 4, 426-434.

MacGowan, R., MacGowan, C., Serdula, M., Lane, J. M., Joesoef, R., & Cook, F. (1991). Breast-feeding among women attending women, infants, and children clinics in Georgia, 1987. Pediatrics, 87, 361-366.

Mamunes, P., Prince, P. E., Thornton, N. H., Hunt, P. S., & Hitchcock, E.S. (1976). Intellectual deficits after transient tyrosinemia in the term neonate. Pediatrics, 57, 675-680.

Martinez, G., & Dodd, D. (1983). 1981 Milk feeding patterns in the U.S. during the first 12 months of life. Pediatrics, 71(2), 166-170.

Martinez, G., & Nalezienski, J. (1979). The recent trend in breastfeeding. Pediatrics, 64(5), 686-692.

Martinez, G., & Nalezienski, J. (1981). 1980 Update: The recent trend in breastfeeding. Pediatrics, 67(2), 260-263.

Melhuish, E. C. (1989). Maternal psychological state and infant development with mothers under twenty: A research note. Journal of Child Psychology and Psychiatry, 30, 925-930.

Menkes, J. (1977). Early feeding history of children with learning disorders. Developmental Medicine in Child Neurology, 19, 169-171.

Miller, B., & Moore, K. (1990). Adolescent sexual behavior, pregnancy and parenting: Research through the 1980's. Journal of Marriage and the Family, 52(4), 1025-1044.

Morrow-Tlucak, M., Haude, R., & Ernhart, C. (1988). Breastfeeding and cognitive development in the first 2 years of life. Social Science Medicine, 26(6), 635-639.

Mulford, C. (1990). Infant feeding and infectious disease. Pediatrics, 86, 806-807.

Neifert, M., Gray, J., Gary, N., & Camp, B. (1988). Factors influencing breastfeeding among adolescents. Journal of Adolescent Health Care, 9, 470-473.

Newson, J. (1977). An intersubjective approach to the systematic description of mother-infant interaction. In H.R. Schaffer (Ed.), Studies in Mother-Infant Interaction (pp. 47-61). London: Academic Press.

Noble, C., Shafaie, M. S., & Self, P. (1982, March). Individual differences in early social interaction: Neonatal gaze aversion. Paper presented at the International Conference on Infant Studies, Austin, Texas.

Osofsky, J., & Connors, K. (1979). Mother-infant interaction: An integrative view of a complex system. In Joy Osofsky (Ed.), Handbook of Infant Development, New York: John Wiley & Sons, Inc.

Osofsky, J., Culp, A., & Ware, L. (1988). Intervention challenges with adolescent mothers and their infants. Psychiatry, 51, 236-241.

Osofsky, J., & Danzger, B. (1974). Relationships between neonatal characteristics and mother-infant interaction. Developmental Psychology, 10(1), 124-130.

Papousek, H., & Papousek, M. (1977). Mothering and the cognitive head-start: Psychobiological considerations. In H.R. Schaffer (Ed.), Studies in Mother-Infant Interaction (pp. 63-85). London: Academic Press.

Pascoe, J. (1982). Teenagers and breastfeeding. Pediatrics, 70(4), 661-662.

Perry, S. (1983). Parents perceptions of their newborn following

structured interactions. Nursing Research, 32(4), 208-212.

Position of the American Dietetic Association: Promotion of breast feeding. (1986). Journal of the American Dietetic Association, 86, 1580-1585.

Rassin, D. K., Gaull, G. E., Raiha, N. C. R., & Heinone, K. (1977). Milk protein quantity and quality in low-birth-weight infants. IV. Effects on tyrosine and phenylalanine in plasma and urine. Journal of Pediatrics, 90, 356-360.

Rassin, D., Richardson, J., Baranowski, T., Nader, P., Guenther, N., Bee, D., & Brown, J. (1984). Incidence of breastfeeding in a low socioeconomic group of mothers in the US: Ethnic patterns. Pediatrics, 73, 132-137.

Ray, D., & Estok, P. (1984). Infant feeding choice and the adolescent mother. Journal of Gynecologic and Neonatal Nursing, 13, 115-118.

Rodgers, B. (1978). Feeding in infancy and later ability and attainment: A longitudinal study. Developmental Medicine and Child Neurology, 20, 421-426.

Roggman, L., & Peery, J. C. (1989). Parent-infant social play in brief encounters: Early gender differences. Child Study Journal, 19, 65-79.

Rubin, D., Leventhal, J., Krasilnikoff, P., Kuo, H. S., Jekel, J., Weile, B., Levee, A., Kurzon, M., & Berget, A. (1990). Relationship between infant feeding and infectious illness: A prospective study of infants during the first year of life. Pediatrics, 85, 464-471.

Ruff, C. (1987). How well do adolescents mother? Maternal Child Nursing, 12, 249-253.

Ryan, A., Rush, D., Krieger, F., & Lewandowski, G. (1991). Recent declines in breast-feeding in the United States, 1984-1989. Pediatrics, 88, 719-727.

Sanders, L. (1962). Issues in early mother-child interaction. Journal of American Academy of Child Psychiatry, 1, 141-166.

Shafaie, M. S., Self, P., Noble, C., & Allen, R. (1986, April). Gaze aversion in the first year of life. Paper presented at the Fifth Biennial International Conference on Infant Studies, Los Angeles, California.

Sharbaugh, C. S. (Ed.). (1991). Call to action: Better nutrition for mothers, children and families. Washington, D.C.: National Center for Education in Maternal and Child Health, 24.

Spitz, R. (1965). The First Year of Life. New York: International Universities Press.

Stern, D. (1974). Mother and infant at play: the dyadic interaction involving facial, vocal, and gaze behaviors. In Michael Lewis &

Leonard Rosenblum (Eds.), The Effect of the Infant on Its Caregiver (pp. 187-213). New York: John Wiley & Sons.

Stotland, N., & Peterson, C. (1985). A modest proposal: Breastfeeding for the infants of adolescent mothers. Advanced Psychosometric Medicine, 12 81-90.

Switzky, L., Vietze, P., & Switzky, H. (1979). Attitudinal and demographic predictors of breastfeeding and bottlefeeding behavior by mothers of six week old infants. Psychological Reports, 45, 3-14.

Taylor, B., & Wadsworth, J. (1984). Breastfeeding and child development at five years. Developmental Medicine and Child Neurology, 26, 73-80.

Teply, L. J. (1979). Breastfeeding, milk and UNICEF. In Dana Raphael (Ed.), Breastfeeding and Food Policy in a Hungry World (pp. 253-258). New York: Academic Press, Inc.

Williams, C., Baumslag, N., & Jelliffe, D. (1985). Mother and Child Health. London: Oxford University Press.

Worobey, J., & Belsky, J. (1982). Employing the Brazelton scale to influence mothering: An experimental comparison of three strategies. Developmental Psychology, 18(5), 736-743.

Yoos, L. (1985). Developmental issues and the choice of feeding method of adolescent mothers. Journal of Obstetric, Gynecologic, and Neonatal Nursing, 14, 68-72.

Young, M. (1988). Parenting during mid-adolescence: a review of developmental theories and parenting behaviors. Maternal Child Nursing, 17, 1-12.

APPENDIXES

APPENDIX A

RAW DATA

OBS	IDN	LNUM	MBMO	MBDA	MBYR	MDOB	RACE	GRADE	MARSTA	INCLEV	INCSRC	INFSEX	IBMO	IBDA	IBYR	SMO	SDA	SYR	IDOB	SDATE	IBWT	CKDATA	TYDEL	ANES	PROLD	IEATS	BRFD	BRBOT	FSTBOT	NUMBOT	WEANED	WHNWEAN	FREML	DURML	FREMV	DURMV	FREMT
1	10	2	6	4	76	5999	3	5	1	1	3	1	2	7	92	4	22	92	11725	11800	0	3175	2	1	1	14	2	1	2	1	4	29	508	110	372	20
2	22	2	2	22	73	4801	1	7	5	2	2	2	2	14	92	5	21	92	11732	11829	0	4564	2	3	1	13	2	1	1	5	1	5	11	503	150	407	39
3	23	2	7	11	76	6036	3	6	1	4	3	1	3	22	92	6	19	92	11769	11858	0	3062	2	4	1	10	1	2	8	7	3	6	15	489	124	362	14
4	24	2	2	25	74	5169	3	7	1	2	5	2	4	7	92	6	16	92	11785	11855	0	3544	2	1	1	5	3	2	8	7	2	6	6	419	136	261	17
5	57	2	6	21	75	5650	1	7	1	4	3	2	1	11	93	4	9	93	12064	12152	0	3487	1	6	2	12	4	1	3	2	2	6	7	390	115	428	32
6	46	2	5	6	75	5604	1	7	1	1	3	2	12	24	92	3	3	93	12046	12115	0	3544	1	1	2	14	2	1	2	6	1	1	3	537	149	401	21
7	45	2	12	13	75	5825	1	5	5	1	3	2	12	24	92	3	3	93	12046	12115	0	3203	1	6	2	21	4	1	4	2	1	3	12	519	159	284	31
8	47	2	10	9	77	6491	3	5	4	1	3	2	12	28	92	3	9	93	12050	12121	0	3062	1	6	2	10	1	2	8	7	3	6	22	411	138	354	18
9	48	2	7	23	75	5682	1	7	5	2	2	1	12	1	92	3	10	93	12023	12122	0	3005	1	1	2	10	1	2	8	7	3	6	6	537	110	321	16
10	50	2	1	27	78	6601	3	3	1	1	5	1	12	30	92	3	17	93	12052	12129	0	3742	1	2	2	15	1	2	8	7	3	6	6	516	156	297	33
11	51	2	7	13	78	6768	1	4	2	2	2	1	12	31	92	3	17	93	12053	12129	0	3770	1	6	2	12	4	1	4	4	2	6	6	414	197	327	11
12	52	2	9	25	75	5746	3	5	1	1	3	2	1	13	93	4	6	93	12066	12149	0	3203	1	6	2	10	1	2	8	7	3	6	8	536	175	174	24
13	53	2	2	13	76	5887	1	6	4	2	1	2	1	28	93	4	8	93	12081	12151	0	2637	1	6	2	10	2	1	1	1	1	2	10	467	148	136	10
14	54	2	4	9	76	5943	1	6	2	3	2	2	1	15	93	4	8	93	12068	12151	0	2948	1	1	1	14	2	1	3	5	1	4	7	496	174	194	12
15	55	2	9	17	76	6104	3	4	6	1	4	1	2	4	93	4	8	93	12088	12151	0	2868	1	6	2	12	4	1	1	2	4	6	6	509	186	361	13
16	25	2	1	19	76	5862	1	6	1	1	3	1	10	5	92	1	7	93	11966	12060	0	4111	1	2	1	15	1	2	8	7	3	6	18	529	131	143	3
17	26	2	3	13	75	5550	1	7	2	2	2	1	9	13	92	1	7	93	11944	12060	0	3090	2	1	1	13	1	2	8	7	3	6	14	531	100	441	10
18	28	2	9	9	80	7557	3	1	1	1	5	1	10	16	92	1	8	93	11977	12061	0	3997	1	6	2	1	1	2	8	7	3	6	35	393	48	55	2
19	31	2	10	9	78	6856	3	3	1	1	3	2	10	31	92	1	15	93	11992	12068	0	2807	1	6	2	10	1	2	8	7	3	6	14	517	138	300	18
20	32	2	10	22	75	5773	1	6	5	1	2	1	10	31	92	1	28	93	11992	12081	0	2868	1	2	2	1	1	2	8	7	3	6	13	527	91	321	6

OBS	DURMT	FREIL	DURIL	FREIV	DURIV	FREIT	DURIT	FREMG	DURMG	HISE1	HISE2	HISE3	HISE4	HISE5	HISE6	HISE7	HISE8	HISE9	HISE10	HISE11	HISE12	HISE13	HISE14	HISE15	HISE16	HISE17	HISE18	HISE19	HISE20	HISE21	HISE22	HISE23	HISE24	HISE25	SUMMOT	SUMIOT	FDGMET	MAGE	IAGE
1	112	39	295	95	144	13	28	24	151	3	5	5	4	5	2	5	1	1	1	1	1	1	4	5	2	1	5	3	2	5	5	.	3	5	992	467	2	15.8932	75
2	383	38	326	32	40	20	26	30	142	5	3	5	5	5	5	5	1	5	1	1	1	1	1	5	3	1	1	5	3	3	5	5	5	5	1293	392	2	19.2548	97
3	499	47	235	25	34	25	74	16	48	1	1	4	5	5	4	5	2	4	1	1	2	1	5	5	1	1	1	4	4	5	2	4	1350	343	1	15.9507	89
4	484	51	191	71	140	33	37	12	44	1	2	5	3	4	5	4	2	5	2	1	2	2	5	5	5	1	4	4	4	5	4	5	2	5	1164	368	2	18.3178	70
5	403	34	372	45	58	16	68	31	130	1	1	4	5	5	5	4	2	3	1	1	2	1	4	4	2	1	5	1	1	5	5	5	1	5	1221	498	2	17.8137	68
6	128	27	382	26	36	1	7	23	136	3	2	3	5	5	3	3	2	2	1	1	2	1	3	5	3	1	4	1	2	3	3	4	3	4	1066	425	1	17.8384	69
7	421	30	473	66	90	33	70	40	125	5	5	3	5	5	4	3	4	4	5	1	5	5	2	4	2	1	1	5	1	5	5	4	1	3	1224	633	2	17.2329	69
8	432	36	388	75	108	32	192	22	113	1	3	5	5	5	4	5	1	3	1	1	3	1	5	5	3	1	5	2	1	5	5	4	1	5	1197	688	1	15.4247	71
9	378	33	367	23	29	3	172	20	92	5	5	3	4	4	3	3	4	1	1	2	2	1	3	5	1	2	4	1	1	4	4	4	4	3	1236	568	1	17.6438	99
10	198	34	495	81	94	35	186	28	220	1	1	2	3	1	3	1	3	3	3	1	1	3	3	1	1	3	5	1	1	1	1	2	2	3	1011	775	1	15.1452	77
11	468	48	270	42	35	33	170	15	62	1	1	4	5	4	3	4	1	3	2	1	1	1	4	4	2	1	4	1	1	5	4	4	1	5	1209	475	2	14.6877	76
12	474	47	215	49	63	30	165	20	69	1	3	3	4	5	4	4	2	5	1	3	2	1	5	5	3	2	5	2	1	5	4	5	1	4	1184	443	1	17.5425	83
13	473	38	249	49	47	41	88	21	73	1	1	4	4	4	4	4	3	3	2	1	1	3	1	3	3	3	3	3	1	1	5	4	5	4	5	1076	384	1	17.1616	70
14	474	23	458	37	31	22	165	23	113	1	1	4	4	4	5	4	2	3	5	1	1	1	4	5	2	1	4	1	1	4	4	4	2	4	1164	654	2	17.0082	83
15	508	40	308	29	30	22	351	15	67	1	5	5	5	5	5	5	3	3	1	1	1	1	5	5	3	1	5	1	1	3	3	5	1	1	1378	689	2	16.5671	63
16	531	46	277	82	212	9	111	30	208	3	4	3	3	4	4	3	5	4	3	3	2	3	4	3	3	2	3	3	4	4	3	4	3	4	1203	600	1	16.9808	94
17	494	48	223	48	199	8	81	39	97	1	1	5	5	4	4	5	1	5	1	1	1	1	5	5	5	1	5	1	1	5	5	5	1	4	1466	503	1	17.8356	116
18	531	15	74	62	63	23	37	8	34	2	3	2	5	3	4	2	3	5	3	2	2	3	3	2	2	2	3	3	2	5	3	3	5	3	979	174	1	12.3397	84
19	506	33	379	70	121	21	42	32	153	1	1	3	3	5	5	4	1	3	1	1	3	3	4	5	1	1	4	1	1	5	5	5	1	5	1323	542	1	14.2795	76
20	517	25	124	31	32	17	111	17	56	2	3	4	2	3	3	3	4	4	3	1	3	3	3	2	4	3	3	3	1	3	3	3	3	3	1365	267	1	17.2822	89

OBS	IDN	LNUM	MBMO	MBDA	MBYR	MDOB	RACE	GRADE	MARSTA	INCLEV	INCSRC	INFSEX	IBMO	IBDA	IBYR	SMO	SDA	SYR	IDOB	SDATE	CKDATA	IBWT	TYDEL	ANES	PROLD	IEATS	BRFD	BRBOT	FSTBOT	NUMBOT	WEANED	WHNWEAN	FREML	DURML	FREMV	DURMV	FREMT
21	33	2	10	29	75	5780	1	6	1	1	3	1	11	1	92	1	28	93	11993	12081	0	3770	1	1	2	10	1	2	8	7	3	6	8	533	116	421	12
22	34	2	5	11	77	6340	3	4	1	1	3	1	11	21	92	2	5	93	12013	12089	0	3289	1	6	2	17	4	1	2	2	2	6	9	514	143	264	31
23	35	2	8	17	75	5707	3	7	6	3	3	1	11	24	92	2	9	93	12016	12093	0	3147	1	6	2	10	1	2	8	7	3	6	18	520	111	416	5
24	36	2	7	3	76	6028	3	6	1	1	3	1	11	30	92	2	10	93	12022	12094	0	3600	1	1	2	5	4	1	3	1	2	6	7	536	177	302	83
25	37	2	3	7	76	5910	1	6	6	1	3	2	11	23	92	2	11	93	12015	12095	0	2608	1	2	2	22	4	1	1	2	2	6	21	511	91	294	32
26	38	2	3	23	75	5560	1	6	2	2	2	1	11	7	92	2	11	93	11999	12095	0	3997	1	2	2	5	3	2	8	7	2	6	8	531	124	299	28
27	39	2	12	28	74	5475	1	7	1	1	3	2	12	16	92	2	18	93	12038	12102	0	3770	2	4	1	13	1	2	8	7	3	6	11	532	115	412	31
28	40	2	1	17	76	5860	1	5	2	3	2	2	11	24	92	2	18	93	12016	12102	0	3345	1	1	1	21	4	1	3	5	2	6	2	539	157	345	19
29	41	2	11	18	76	6166	1	5	6	2	5	1	12	22	92	2	23	93	12044	12107	0	3175	1	2	2	15	1	2	8	7	3	6	28	505	74	401	47
30	42	2	6	9	79	7099	3	3	1	1	3	2	11	29	92	2	24	93	12021	12108	0	2868	2	4	1	10	1	2	8	7	3	6	8	534	187	220	30
31	43	2	11	4	75	5786	1	5	1	1	3	2	11	10	92	2	24	93	12002	12108	0	3600	1	2	2	10	2	1	1	6	1	1	9	524	117	409	13
32	44	2	3	31	74	5203	3	7	1	2	5	1	12	1	92	2	26	93	12023	12110	0	2948	2	1	1	10	1	2	8	7	3	6	49	495	157	266	59

OBS	DURMT	FREIL	DURIL	FREIV	DURIV	FREIT	DURIT	FREMG	DURMG	HISSE1	HISSE2	HISSE3	HISSE4	HISSE5	HISSE6	HISSE7	HISSE8	HISSE9	HISSE10	HISSE11	HISSE12	HISSE13	HISSE14	HISSE15	HISSE16	HISSE17	HISSE18	HISSE19	HISSE20	HISSE21	HISSE22	HISSE23	HISSE24	HISSE25	SUMMOT	SUMIOT	FDGME	MAGE	IAGE
21	512	51	409	32	60	26	190	39	185	4	1	4	5	4	5	5	4	4	1	3	1	2	4	4	4	1	4	1	1	5	4	5	1	5	1466	659	1	17.2630	88
22	200	38	381	42	97	4	69	28	121	1	2	3	4	4	4	3	2	3	3	2	4	2	3	3	3	2	3	1	1	5	3	4	2	4	978	547	2	15.7507	76
23	525	34	298	71	194	11	215	26	225	2	2	3	5	4	5	4	3	3	2	2	4	3	3	3	2	2	4	5	2	4	3	4	5	4	1461	707	1	17.4959	77
24	401	39	246	35	44	40	161	34	152	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1239	451	2	16.6192	72
25	414	40	239	56	45	33	174	34	118	2	3	2	4	5	4	4	5	4	3	4	4	3	2	1	4	3	2	5	3	3	2	4	3	2	1219	458	2	16.9452	80
26	429	25	402	43	128	24	114	44	263	2	1	1	2	4	5	4	5	4	3	5	4	4	3	3	5	3	3	3	2	5	3	5	5	4	1259	644	2	17.9041	96
27	409	18	484	29	64	28	190	39	277	3	2	1	1	4	4	4	3	3	4	3	4	2	3	4	3	4	3	3	4	5	3	4	4	4	1353	738	1	18.1562	64
28	253	13	526	41	87	10	125	36	364	1	2	4	4	4	5	4	2	3	1	2	2	2	4	4	3	2	4	1	2	4	4	5	3	4	1137	738	2	17.1014	86
29	269	48	346	42	77	7	65	26	174	5	5	3	4	1	1	1	5	1	5	5	3	5	5	1	1	5	1	5	3	1	1	1	5	2	1175	488	1	16.2767	63
30	445	47	253	37	59	50	255	26	101	5	1	5	5	4	5	5	1	1	1	1	1	5	5	5	1	5	1	1	1	5	4	5	1	5	1199	567	1	13.7233	87
31	409	46	289	62	83	16	272	29	133	2	3	5	.	4	4	4	5	4	5	4	4	4	5	5	3	2	4	4	5	5	4	4	4	5	1342	644	1	17.3205	106
32	276	33	442	38	85	17	92	40	224	1	1	2	5	5	5	5	2	5	1	1	1	1	5	5	1	3	5	1	1	5	5	5	1	5	1037	619	1	18.9233	87

APPENDIX B

ADDITIONAL TABLES

TABLE 8

Maternal Behaviors - Maternal Age

Group	*Duration Maternal Looking*	*Duration Maternal Vocal*	*Duration Maternal Tactile*	*Total Maternal Contact*
12-15 years	477 (55)	283 (99)	377 (160)	1138 (150)
16-17.5 years	518 (20)	300 (102)	442 (89)	1260 (122)
17.6-19 years	497 (55)	360 (72)	376 (113)	1233 (134)

Note. All durations are reported in seconds as Mean (SD).

TABLE 9

Infant Behaviors - Maternal Age

Group	*Duration Infant Looking*	*Duration Infant Vocal*	*Duration Infant Tactile*	*Total Infant Contact*
12-15 years	308 (121)	84 (38)	117 (84)	509 (177)
16-17.5 years	318 (112)	78 (57)	162 (80)	558 (142)
17.6-19 years	354 (95)	87 (58)	87 (63)	528 (124)

Note. All durations are reported in seconds as Mean (SD).

TABLE 10

Mutual Gaze - Maternal Age

Group	*Duration Mutual Gaze*
12-15 years	111 (59)
16-17.5 years	147 (83)
17.6-19 years	156 (81)

Note. All durations reported in seconds as Mean (SD).

TABLE 11

Maternal Behaviors - Race, Infant Gender and Feeding Method

Group	*Duration Maternal Looking*	*Duration Maternal Vocal*	*Duration Maternal Tactile*	*Total Maternal Contact*
African/ Native American Females				
Breast	419.0	261.0	484.0	1164
(n=1)	-	-	-	-
Bottle	499.5	262.0	464.3	1226
(n=4)	(59.6)	(80.4)	(32.9)	(65)
Males				
Breast	516.8	324.8	305.3	1146
(n=4)	(13.7)	(50.8)	(181.4)	(195)
Bottle	482.6	279.2	405.8	1168
(n=5)	(51.8)	(138.1)	(157.0)	(222)
Caucasian Females				
Breast	493.0	325.3	391.3	1210
(n=6)	(52.6)	(86.6)	(74.3)	(54)
Bottle	515.0	339.5	354.8	1209
(n=4)	(32.4)	(135.7)	(154.1)	(160)
Males				
Breast	472.5	313.0	448.5	1234
(n=2)	(82.7)	(19.8)	(27.5)	(35)
Bottle	527.0	341.3	450.2	1318
(n=6)	(11.3)	(109.5)	(104.7)	(131)

Note. All durations are reported in seconds as Mean (SD).

TABLE 12

Infant Behaviors - Race, Infant Gender and Feeding Method

Group	*Duration Infant Looking*	*Duration Infant Vocal*	*Duration Infant Tactile*	*Total Infant Contact*
African/ Native American Females				
Breast	191.0	140.0	37.0	368
(n=1)	-	-	-	-
Bottle	308.8	87.8	163.5	560
(n=4)	(87.8)	(31.4)	(89.3)	(100)
Males				
Breast	307.5	78.8	152.3	539
(n=4)	(55.8)	(52.2)	(143.7)	(109)
Bottle	308.8	94.0	120.8	524
(n=5)	(168.2)	(60.5)	(76.1)	(255)
Caucasian Females				
Breast	399.0	58.5	104.7	506
(n=6)	(106.5)	(24.8)	(59.3)	(133)
Bottle	351.0	57.5	139.3	548
(n=4)	(104.7)	(20.5)	(115.9)	(171)
Males				
Breast	336.0	81.5	142.0	560
(n=2)	(93.3)	(65.8)	(39.6)	(120)
Bottle	291.0	101.5	121.7	135
(n=6)	(105.3)	(82.6)	(49.6)	(61)

Note. Durations are reported in seconds as Mean (SD).

TABLE 13

Mutual Gaze - Race, Infant Gender and Feeding Method

Group	*Duration Mutual Gaze*
African & Native American	
Females	
Breast (n=1)	44.0 -
Bottle (n=4)	109.0 (34.7)
Males	
Breast (n=4)	122.8 (39.9)
Bottle (n=5)	150.2 (99.8)
Caucasian	
Females	
Breast (n=6)	165.3 (97.8)
Bottle (n=4)	154.8 (86.5)
Males	
Breast (n=2)	162.5 (142.1)
Bottle (n=6)	135.3 (61.5)

Note. Durations reported in seconds as Mean (SD).

APPENDIX C

VOLUNTARY AGREEMENT TO PARTICIPATE FORM

AGREEMENT TO PARTICIPATE

I, _____, hereby, authorize Karen Winfrey, BSN, or other trained persons under her supervision, to perform the following procedures:

1. Videotaping me and my infant at Margaret Hudson. The videotaping session will last approximately 30 minutes. During the procedure my baby and I will be asked to play together as we usually do. Names will not be attached to the videotapes to ensure confidentiality as much as possible, and tapes will be destroyed once the desired information has been obtained. Further, the data will be examined along with a group of mother-infant pairs so that individual data will not be identifiable.

2. If at any time during the videotaping I decide I no longer wish to participate, I am free to withdraw from the study. I do not foresee any adverse effects from this research, and I hope that my baby and I will benefit from this additional play time together.

3. Obtaining family background information including my background, pregnancy, delivery and early infant care. This information will be obtained through interview and questionnaires.

This is done as part of an investigation entitled "Adolescent Mother-Infant Interaction During Play." The purpose of the procedure is to identify differences in mother-infant interaction among adolescents.

I understand that participation is voluntary, that there is no penalty for refusal to participate, and that I am free to withdraw my consent and participation in this study at any time without penalty after notifying the project director.

I may contact Karen Winfrey (918-836-7904) or Patricia A. Self (405-744-8348) should I wish further information about the research. I may also contact Le Ann Prater, University Research Services, 002 Life Sciences East, Oklahoma State University, Stillwater, Oklahoma 74078; 405-744-9992.

I have read and fully understand this form. I sign it freely and voluntarily. A copy has been given to me.

Date: _____ Time: _____

Mother's Signature: _____

I certify that I have personally explained all elements of this form to the subject before requesting the subject to sign it.

Researcher's Signature: _____

APPENDIX D

INTERVIEW FORMS

ID# _____

1. Use *black* ink. Fill in as much of this record as possible.
2. Print the name of the head of the family first, then list all family members.

✓	No.	NAMES LAST	FIRST & M.I.	SEX	RACE 1. White 2. Hispanic 3. Black 4. Indian 5. Other	DATE OF BIRTH (EXAMPLE) (12-20-20)	RELATION TO HEAD OF FAMILY	GRADE IN SCHOOL	MARITAL STATUS 1. Single 2. Married 3. Divorced 4. Separated 5. Living Together 6. Other

Person(s) with income:

1. _____
2. _____
3. _____

Source(s) of Income:

Employer: _____
AFDC _____ SSI _____
Unemployment _____
Other: _____

Gross income (before taxes, etc.)

_____
_____
_____
_____

Number of persons in household: _____ Total Family Income: _____

ID# _____
Date _____
Time _____
Interviewer _____

BACKGROUND INFORMATION

1. Please state the date of your birth, including year. _____

2. Please state the date of birth of your baby. _____

3. What is the sex of your baby?
_____ male _____ female

4. What was your baby's birth weight?
_____ lbs. _____ ozs.

5. What type of delivery did you have?
_____ vaginal _____ Csection

6. How long did you labor? _____
_____
_____
_____

7. Did you have any anesthesia?
_____ yes _____ no _____ don't know

8. If yes, please indicate the kind.
_____ epidural _____ local
_____ spinal _____ general _____ unsure

9. Did you have problems or complications with your labor or delivery?
_____ yes _____ no

10. If yes, please explain. _____
_____
_____
_____

11. What is your baby eating?
_____ formula SMA Sim c Fe Sim Enf c Fe Enf Other
_____ breastmilk
_____ cereal
_____ water
_____ juice (state kind) _____
_____ other (state what) _____
_____
_____

12. Do you or did you ever breastfeed your baby?
_____ yes _____ no _____ sometimes
_____ I tried, but don't anymore
_____ My baby eats only at breast
_____ My baby eats from bottle & from breast_____
_____
_____

13. If you have breastfed your baby, has your baby ever received a bottle? _____ yes _____ no

14. If your baby has been breastfed and received a bottle, how old was your baby when he/she received the first bottle?
_____ in the hospital
_____ within the first week
_____ 2 to 4 weeks
_____ 5 to 6 weeks
_____ 7 to 8 weeks
_____ 9 to 10 weeks
_____ 11 to 12 weeks

15. If you are or did breastfeed and your baby also receives/d bottles how many bottles did/does the baby receive?
_____ less often than 1 bottle per week
_____ 1 to 3 bottles per week
_____ 4 to 6 bottles per week
_____ 1 bottle per day
_____ 2 to 4 bottles per day
_____ more than 4 bottles per day

16. Have you weaned your baby from the breast?
_____ yes _____ no

17. If yes, when did you stop breastfeeding?
_____ 1 week or less
_____ 2 to 4 weeks
_____ 5 to 7 weeks
_____ 2 months
_____ other _____

VITA

KAREN BUNN WINFREY

Candidate for the Degree of

Master of Science

Thesis: THE RELATIONSHIP OF INFANT FEEDING METHOD AND ADOLESCENT MOTHER-INFANT INTERACTION

Major Field: Family Relations and Child Development
Emphasis in Family Relations

Biographical:

Personal Data: Born in Ft. Worth, Texas, On April 29, 1953, the daughter of J.C. and Helen Bunn.

Education: Graduated from Will Rogers High School, Tulsa, Oklahoma in May 1971; attended Oklahoma Baptist University School of Nursing, Shawnee, Oklahoma for 1971-72 year; transferred 1972 and received a Bachelor of Science degree in Nursing from the University of Tulsa in June 1975. Completed the requirements for the Master of Science degree with a major in Family Relations and a minor in Child Development at Oklahoma State University in December 1993.

Experience: Commissioned as a missionary nurse by the Foreign Mission Board of the Southern Baptist Convention, August 1975 and served a 2 year term in the Gaza Strip: served in the capacities of staff nurse, charge nurse and instructor in the hospital nursing school; worked as staff nurse in regional burn center at Hillcrest Medical Center, Tulsa, Oklahoma; worked 3 years as home visiting nurse in Maternal-Child Health with the Tulsa City-County Health Department; worked 11 years at St. John Medical Center, Tulsa, Oklahoma: staff nurse, developed curriculum and content and implemented sibling classes, developed hands-on infant care classes with live baby, served 3 years as Coordinator of Parenting Education developing content,

coordinating and implementing prenatal breastfeeding classes, an infant car seat rental program, infant-child CPR classes and numerous other parenting classes on developmental issues such as discipline, communication and age appropriate development and activities; worked as home visiting nurse with Visiting Nurse Association of Tulsa, Inc., January 1993 to present.

Professional Memberships: Oklahoma State Student Nurses Association, 1971-1975: served as Secretary 1972-1974; National Council on Family Relations; Oklahoma Council on Family Relations: served as Secretary 1991; Family Resource Coalition; National Association for the Education of Young Children; Tulsa Coalition for Parenting Education.

OKLAHOMA STATE UNIVERSITY
INSTITUTIONAL REVIEW BOARD
FOR HUMAN SUBJECTS RESEARCH

Proposal Title: Adolescent Mother-Infant Interaction at Play

Principal Investigator: P. Self/K. Winfrey

Date: 1-2-92 IRB # HE-92-024

This application has been reviewed by the IRB and

Processed as: Exempt [ ] Expedite [ ] Full Board Review [X]

Renewal or Continuation [ ]

Approval Status Recommended by Reviewer(s):

Approved [X] Deferred for Revision [ ]

Approved with Provision [ ] Disapproved [ ]

Approval status subject to review by full Institutional Review Board at next meeting, 2nd and 4th Thursday of each month.

Comments, Modifications/Conditions for Approval or Reason for Deferral or Disapproval:

Comments: Please make minor changes to the consent forms and send LeAnn Prater 002 LSE at copy for the files.

Signature: Marcia D. Tilley Date: 2-28-92
Chair of Institutional Review Board