Early Childhood Feeding Interactions: Maternal and Child Contributions

By

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ABSTRACT

TITLE: Early Childhood Feeding Interactions: Maternal and Child Contributions

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A primary parenting task is helping young children establish healthy feeding patterns that will support ongoing growth and development. Unfortunately, significant numbers of young children develop feeding patterns that lead to nutrition problems, such as failure to thrive and, increasingly, obesity. Feeding interaction during early childhood can be viewed as a medium in which the interplay of genetic, environmental, and interpersonal factors shapes subsequent eating behaviors. This study was undertaken to further the understanding of feeding interaction quality during the transition from infant dependence to toddler independence in feeding. One of the primary aims of this study was to examine the reliability and validity of the Nursing Child Assessment of Feeding Scale (NCAFS) during toddlerhood. The second major aim of this study was to assess how maternal characteristics of relationship history of parental care and overprotection/control, maternal beliefs related to child development, and child temperament may contribute to variations in feeding interactions. A longitudinal design was used to assess both NCAFS reliability and validity and maternal and child contributions to feeding interaction quality at 12, 24, and 36 months. Videotaped feeding observations of 116 mother-toddler dyads, collected as part of a larger study examining mother-child interactions and adaptations of toddlers, were coded using the NCAFS. These dyads were recruited when the children were infants primarily from a family practice medical clinic. Reliability of the NCAFS at 12, 24, and 36 months was explored through assessment of interrater reliability, internal consistency of the various subscales and the scale as a whole, and stability of the scale measurements over time. Interrater reliability was generally quite good. The internal consistency of the NCAFS was low at each age. Maternal contributions to feeding interaction quality demonstrated stability over time; dyadic and child contributions did not. Convergent validity was assessed between the NCAFS and the Snack Scale using MANOVA and ANOVA. Convergence was best at 12 months, reached its nadir at 24 months, and improved moderately at 36 months. In order to assess maternal and child contributions to feeding interaction quality, separate multiple regression analyses were conducted in which NCAFS caregiver-child total scores, caregiver scores, and child scores served as dependent variables; the maternal and child characteristics served as predictor variables. Only maternal beliefs related to child development uniquely predicted feeding interaction quality: at each age for mothers and at 24 months for children and dyads. The findings are discussed in regard to recommendations for refinement of the NCAFS for toddlerhood and further study of maternal and child contributions to feeding interaction quality. Limitations of the study are identified and implications for nursing are discussed.

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CHAPTER I

INTRODUCTION

A primary parenting task is helping young children establish healthy feeding patterns that will support ongoing growth and development. Unfortunately, significant numbers of children develop feeding problems that lead to either undernutrition- primarily failure to thrive [FTT] (Benoit, 2000), overnutrition- obesity (Mei et al., 1998; Ogden et al., 1997), or later eating disorders, such as anorexia nervosa and bulimia (Marchi & Cohen, 1990). Feeding problems carry health consequences during childhood and have long-lasting effects into adulthood (Benoit, 2000; Cunnane, 1993; Freedman, Dietz, Srinivasan, & Berenson, 1999; Freedman, Khan, Dietz, Srinivasan, & Berenson, 2001). Although such nutrition problems are viewed as responses to a combination of genetic, environmental, and interpersonal factors, calls for early intervention and prevention of these problems often focus on the quality of the parent/child feeding interaction (Satter, 1990). It is proposed that quality in feeding interactions over the course of the developmental transition from relative dependence in infancy to emerging autonomy in toddlerhood contributes to the child's abilities to self-regulate feeding that will support optimal growth and development. Optimal growth and development are individually defined through the constraints of the child's psychobiological capacities and the capacity of the environment to respond to the changing developmental needs and capabilities of the child over time.

Feeding interactions are viewed as particularly important because, as Weinsier (1999) asserted in reference to obesity, it is ultimately through our behaviors rather than genetics or the environment that we remain lean or obese. In infancy and toddlerhood, feeding interactions can be seen as a medium in which the interplay of genetic and environmental influence shapes subsequent behaviors. In observational assessments of interactional quality, mothers of children with FTT have been found to be less sensitive (Hagekull, Bohlin, & Rydell, 1997), less responsive to their infant's cues, and more interfering and controlling (Chatoor, Egan, Getson, Menvielle, & O'Donnell, 1987; Crittenden, 1987). Maternal controlling behaviors in feeding interactions have also been found to contribute to child obesity (Johnson & Birch, 1994). In regard to childhood feeding interventions, caregiver sensitivity and responsiveness to child cues has been advocated as the central focus (Satter, 1990). This is particularly important because, while we cannot modify the child's genetic inheritance, we can potentially intervene in parenting to optimize feeding environments and interactions.

Research and research-based interventions in feeding interactions are limited by the lack of tools that assess feeding beyond the first year of life. The Nursing Child Assessment Feeding Scale (NCAFS) (Sumner & Spietz, 1994a) is an observational checklist used to assess the feeding interaction with a goal of optimizing interactional quality, but it was designed only for infants up to 12 months of age. It had not been established as valid for toddlerhood when parents must accommodate their children's emerging autonomy and when control issues become more salient. Other assessment tools are either focused on interaction involving feeding disorders or have not been widely disseminated. A strong research base for understanding feeding interaction quality

is essential for improving diagnostic, prevention, and intervention capabilities in a variety of pediatric practice settings and across an age range that accommodates the dyad's transition from infant dependence to toddler independence in feeding. Needed is an assessment tool rigorous enough for use in nursing research and clinically sensitive enough for detecting and optimizing problematic interactions in both mild and severe feeding disorders.

A key element in addressing this need was the development of instrumentation that could be used beyond the age of 12 months. Extension of the NCAFS to toddlerhood was a logical next step; it is well-established and already used by over 21,000 certified coders in research and clinical settings worldwide (D. Findlay, personal communication, November 12, 2002). This study was designed to examine the reliability and validity of the NCAFS during toddlerhood in order to enhance its further development and refinement for use in research and early interventions with feeding interactions and their subsequent outcomes. The purpose was to further the understanding of feeding interaction quality over time and to facilitate the development of an assessment tool for toddlerhood that would have utility in both research and clinical practice.

Once reliability and validity of the NCAFS during toddlerhood were explored, selected maternal and child factors were examined for their contribution to feeding interaction quality measured by this extension of the NCAFS. Maternal factors included maternal early relationship history and concepts of child development. Child temperamental difficulty was also assessed for its potential contribution to feeding interaction quality during toddlerhood. Understanding maternal and child characteristics that contribute to feeding interaction quality was expected not only to highlight areas for

further research but also assist in tailoring effective interventions by pediatric, public health, and advanced practice nurses as well as early intervention specialists.

CHAPTER II

REVIEW OF THE LITERATURE

Theoretical Perspectives on Parent-Child Interactions

Multiple perspectives have been and continue to be taken in research regarding parent-child interaction. This section of the paper will focus on the broader categories of unidirectional, bidirectional, and systems approaches under which several theories reside respectively. This is not meant to be an exhaustive review of all the theories that may fall under a particular approach. Rather, it is a consideration of the relevance of particular approaches and/or theories to feeding interactions in early childhood.

Unidirectional Approach

Stafford and Bayer (1993) defined the unidirectional approach to parent-child interaction as one in which the focus is on how the parent shapes what the child becomes. The child is seen as passive, an entity to be molded with its emerging characteristics determined by the characteristics of the parent and the way the parent interacts with the child (Stafford & Bayer, 1993). There is little to no focus on the contribution that innate features of the child may make to interaction and what the child becomes. When such features are considered, the focus is typically on how parenting behaviors may shape this raw material, be it desirable or undesirable, into the 'optimal' child (Stafford & Bayer, 1993).

This approach assumes a linearity of direct cause and effect in parent-child interaction in which the child is viewed as passive and plastic, and the parent is seen as determining what the child becomes by 'building' the child over time. Thus, there is little to no acknowledgement of the active role of the child in shaping its own development.

The child is essentially relegated to a role of being responsive to parental shaping, a reflection of the parent's abilities in the art of parenting, rather than a role of actively initiating (as well as responding) and participating in the quality of interaction and its own ongoing development. The unidirectional approach is limited in its approach to parent-child interaction in feeding because it does not take into account the growing body of knowledge regarding how child characteristics interact with the environment over the course of development.

Bidirectional Approaches

In contrast to unidirectional approaches in which the research focus concerns how the parent affect the child, bidirectional approaches are concerned with how the child affects the parents and how parent and child mutually influence one another over the course of interaction (Stafford & Bayer, 1993). Inherited aspects of the child and their influence on child behavior in interactions with its environment become important considerations (Stafford & Bayer, 1993). Sameroff and Chandler's (1975) transactional model of development can be considered a bidirectional approach, although it can be seen to fit within a larger systems approach as well.

Central to the transactional model of development as delineated by Sameroff and Chandler (1975) is the plasticity of both the caregiving environment and the child. This means that the child and environment are constantly engaging in interaction and reorganizing in mutual response to one another, shaping one another over the course of development. The child, rather than acting only out of reaction to the environment, is seen as actively attempting to shape it and thus, through response of the environment to

these attempts, actively engages in the co-creation of experiences that affect the child's subsequent development (Sameroff & Chandler, 1975).

A central idea from this model is that the child inherently possesses self-righting and self-organizing tendencies which tend to track toward normality over the course of development and are relatively resistant to occasional insults, but less resistant to continuous problems in child-environment interaction over the course of development (Sameroff & Chandler, 1975). For the study of feeding patterns, the implication is that the occasional problem in feeding interaction quality, whether it be due to a child factor such as temporary illness, or a temporary parental factor to which the child cannot adjust, does not doom the child to the development of suboptimal or unhealthy feeding patterns. However, a consistent problem in dyadic interaction quality over the course of development places the child at much higher risk of developing such a feeding problem.

Barnard Model

Another model of interaction that reflects bidirectionality over the course of child development is the Barnard Model (Sumner & Spietz, 1994a) (please see Figure 1). Some time will be spent in its review because it is the model upon which the conceptual model for the proposed study is based.

The Barnard model assumes that each dyadic partner (caregiver/parent and infant/child) has responsibilities for initiating and maintaining adaptive interaction (Sumner & Spietz, 1994a). The child must be clear in its cues to the caregiver and must be responsive to caregiver attempts to respond to those cues (Sumner & Spietz, 1994a). In turn, the caregiver must be responsive to the cues from the child, they must alleviate

the child's distress, and they must provide opportunities for growth and learning (Sumner & Spietz, 1994a).

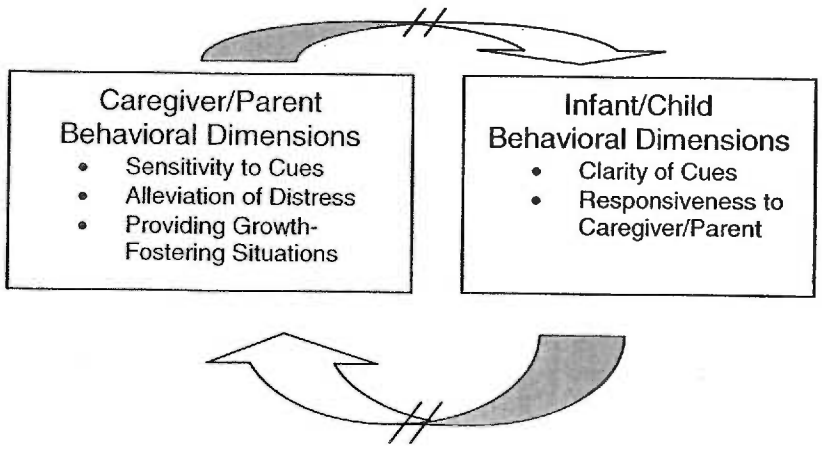

Figure 1. The Barnard Model (Sumner & Spietz, 1994a)

In the model (See Figure 1), the arrows from caregiver to child and from child to caregiver represent the adaptive responses and reactions of each dyadic partner to the other; the breaks in the arrows (//) represent interruptions in this adaptive process that can lead to problems in the interaction (Sumner & Spietz, 1994a). The sources of the interference can arise from the caregiver, child, or the environment (Sumner & Spietz, 1994a). In terms of feeding quality, two essential features of the adaptive interaction are present in this model. These are the consistency and contingency of partner responses to one another over time and the change in adaptive patterns between caregiver and child over time in response to the child's emerging capabilities (Sumner & Spietz, 1994a).

The characteristics of each of the dyadic partners in the Barnard model require definition. Caregiver/parent characteristics include three dimensions. *Sensitivity to cues* is described as the caregiver's ability to recognize and respond contingently to the child's

cues (Sumner & Spietz, 1994a). It is through contingent responsiveness to the child's behavior that the child is thought to learn that they can affect their environment (Sumner & Spietz, 1994a). *Alleviation of distress* is also tied to the caregiver's ability to recognize cues (in this situation, distress), to know the appropriate response, and to enact that response (Sumner & Spietz, 1994a). *Growth fostering* is considered in the realms of social-emotional and cognitive growth. In order to provide these growth-fostering situations, the caregiver must recognize the importance of such stimulation, have an awareness of the child's current developmental level and how to support ongoing development, and enact this stimulation in ways that support this ongoing development (Sumner & Spietz, 1994a).

There are two infant/child characteristics in the model. *Clarity of cues* reflects the child's ability to send unambiguous cues about their needs so that caregivers can modify their responses appropriately (Sumner & Spietz, 1994a). *Responsiveness to caregiver* reflects the child's ability to respond to caregiver overtures in ways that reinforce positive caregiver behaviors or modification of negative caregiver behaviors in order to maintain adaptive interactions between caregiver and child (Sumner & Spietz, 1994a). Of importance in the Barnard model is the recognition that, while both dyadic partners have responsibilities in the interaction, during early infancy the caregiver is seen as having the larger repertoire of behavioral responses. Thus, the caregiver bears the weight of the majority of the responsibility in maintaining adaptive interaction between the two partners (Sumner & Spietz, 1994a). This would be expected to change as the child develops and acquires increasing behavioral capacities.

Systems Approach

The final approach to parent-child interaction to be considered is the systems approach. Stafford and Bayer (1993) suggested that one may view systems frameworks as extensions of bidirectional approaches to interaction. Rather than focusing on the dyad alone, systems approaches consider the ways in which individuals and relationships within families interact and modify one another within culturally and temporally framed contexts (Stafford & Bayer, 1993). For example, relationships between spouses are considered for their impact on the child and the relationship between the child and parents individually, dyadically, and triadically. Sibling interactions can be brought into the mix as can extra-familial relationships. As one might expect, that degree of complexity could become quickly overwhelming. In a systems approach, the particular individual's contribution to interactions would be of less interest than the description of the recurrent patterns of interaction in which the individual engages (Minuchin, 1985).

Magnusson and Cairns (1996) suggest that if one is interested in the study of development, a systems analysis must be involved. Given that the proposed study is interested in the pattern of feeding interactions in the developing child over time, Magnusson and Cairns' (1996) suggestion would necessitate that the study utilize a systems approach. Recall that the proposed conceptual model for this study is based on the Barnard model, a bidirectional approach. How does one reconcile the demands for use of a systems approach in developmental study with a bidirectional conceptual model? As noted above, systems approaches can be viewed as extensions of bidirectional approaches (Stafford & Bayer, 1993).

The answer to this question of reconciliation of approaches may lie in what Gottlieb (1996) calls the "metatheoretical developmental psychobiological systems view" (p. 63). In this view, individual development is seen as hierarchically organized into multiple levels that influence each other. The influence across these levels (e.g., genes, cytoplasm, cell, organ, organ system, organism, behavior, environment) is bidirectional and a key feature of this view is that genes are a vital part of the system and they not only influence the other levels but they can be influenced by the events in the other levels (Gottlieb, 1996).

Essential to this view is the idea of epigenesis, in which individual development demonstrates an increasing organizational complexity through the rise of novel structural and functional properties and abilities throughout the levels of analysis of the individual. This increasing organizational complexity occurs as an outgrowth of interactions both between similar parts, such as cell and cell, and across levels, such as individual and environment (Gottlieb, 1996). Thus, this view is a systems approach that acknowledges bidirectional 'coaction' across hierarchical adjacent levels within and outside the individual. Furthermore, it is this coaction that brings about development, not the components of the levels themselves (Gottlieb, 1996).

This is congruent with Sameroff and Chandler's (1975) discussion of a transactional model and the interaction of systems levels. In this view, developmental outcomes may be suboptimal or pathological through sustained problematic interaction between levels whether this is because of a problem in the individual, the environment, or both. So, what are the implications of this developmental psychobiological systems view in terms of feeding and feeding problems? Consider in the case of obesity, whereas

research has shown individual heritability of variation in obesity-related phenotypes (e.g., body mass index), as high as 50-70 percent (Allison et al., 1996), this cannot be interpreted to be a predetermined outcome. Environmental interaction with a child's genetic propensity toward obesity is logically required in order for phenotypic expression of obesity to occur. The level of person (child) to person (parent) interaction is a place where the proposed horizontal and vertical coactions of the developmental psychobiological systems view can occur.

Study Model

The conceptual model for the proposed study, a modification of the Barnard Model (see Figure 2), articulates well with the metatheoretical view, as well.

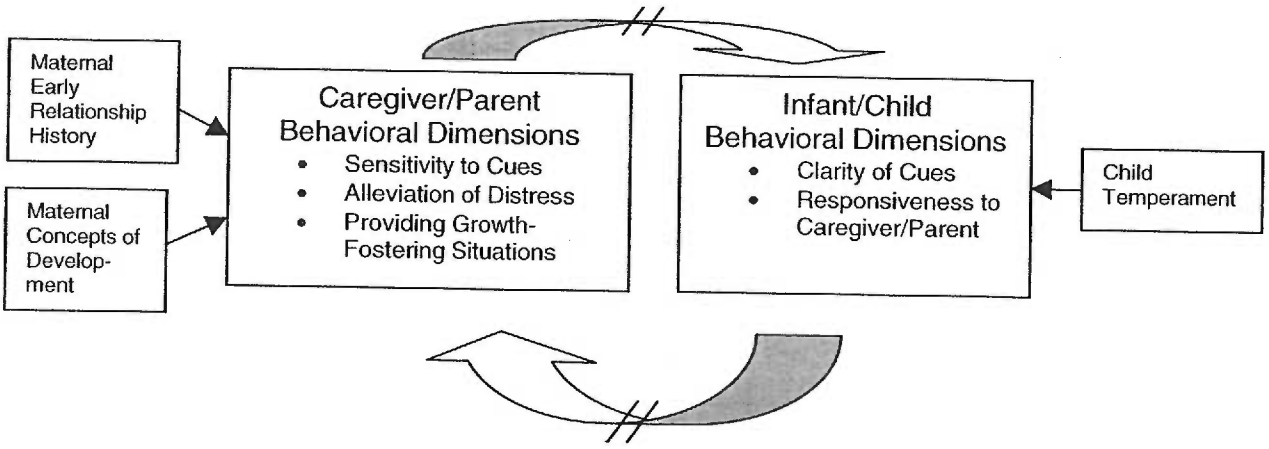

Figure 2. Conceptual Model based on the Barnard model (Sumner & Spietz, 1994a)

Child Temperament

Child temperament is proposed to influence the child's clarity of cues and responsiveness to caregiver. Temperament refers to a constitutional characteristic that, from the beginning of infancy, predisposes an individual to emotional and behavioral response patterns that generally remain stable over time (McClowry, 1992). Among the

most commonly discussed temperament types are the "difficult" child and the "easy" child. Difficult temperament consists of biological function irregularity, withdrawal from new situations, slow adaptation, and intense and negative mood. Easy temperament is characterized by biological regularity, moderate ease in approach to new situations, easy adaptation, and mild and mostly positive mood (McClowry, 1992). Temperament is thought to contribute to early primary relationship interactions and, subsequently, to influence relationship patterns that shape behavior and development (McClowry, 1992; Medoff-Cooper, 1995; Melvin, 1995).

If there is a good match between child temperament and environmental demands, as well as expectations and opportunities (the latter three most often mediated through the primary caregiver), healthy social and emotional growth and development is expected. However, mismatches between a child's temperament and parental interactional behaviors may be detrimental to the child's growth and development (McClowry, 1992; Seifer & Dickstein, 2000). Infants with difficult temperaments may be most vulnerable for problems of undernutrition, given findings for maternal sensitivity to interact with temperament difficulty (Chatoor, Ganiban, Hirsch, Borman-Spurrell, & Mrazek, 2000; Hagekull et al., 1997; Lindberg, Bohlin, Hagekull, & Thunstrom, 1994). Difficulty likely impacts the infant's responsiveness and clarity of cues in the interaction. From this line of reasoning, one may conjecture that temperament may contribute to obesigenic feeding interactions, as well. For example, a mother may interpret her temperamentally difficult child's behaviors as expressions of hunger or lack of satiation, and subsequently overfeed the child.

Maternal Relationship History

Maternal factors of early relationship history and concepts of child development are proposed to influence the parent behavioral dimensions. In regard to maternal early relationship history, attachment theory suggests that early relationship experiences with significant others are internalized and form working models of the self and others within relationship contexts (Ainsworth, Blehar, Waters, & Wall, 1978). Awareness and perceptions of self and others in later close relationships are thought to be influenced by these internal working models. Thus, parental awareness and perceptions of their child's needs and subsequent parental behavioral interactions that support their child's development are thought to be shaped by their internal working models (Trad, 1992).

Several studies of FTT have noted associations between maternal early relationship history and subsequent FTT in their children (Chatoor et al., 2000; Coolbear & Benoit, 1999; Ward, Lee, & Lipper, 2000). Mothers of children with FTT or related disorders were found to have significantly greater incidences of disrupted or insecure attachment representations than mothers in comparison groups with children designated as healthy eaters or growing normally. While no studies of early childhood obesity and potential contributions of maternal early relationship history have been identified, there are studies that have shown the influence of significant others on maternal feeding decisions.

A recent study involving mothers in a WIC program found that grandmothers had great influence on their daughters in interpreting the behavior of their grandchildren and that this shaped mother-child interactions and feeding behaviors, often in contradiction to

advice from health care providers (Baughcum, Burklow, Deeks, Powers, & Whitaker, 1998). Given the proposed relationship of internal working models acting as filters through which parents perceive and respond to a child's needs for nutrition and development, maternal early relationship history is seen as a worthwhile area to explore through its potential contribution to feeding interactions that may lead to childhood obesity.

Maternal Concepts of Development

Maternal perceptions, decisions, and behaviors in dyadic interaction with her child may vary depending on whether she believes that her child's development is entirely related to the child's genetic or biological predisposition (nature), the child's environment (nurture), or some combination. A combination of the two conceptualizations, a transactional approach, allows parents to acknowledge their child's tendencies and needs and modify their behavior accordingly (Lecuyer-Maus & Houck, 2002). Miller-Loncar, Landry, Smith, and Swank (1997) found that such a transactional approach, which they called a child-centered perspective, assessed at 6 and 12 months of child age was predictive of greater maternal use of warm sensitivity in everyday interactions with their child at 24 months. These everyday interactions included feeding. In their study, warm sensitivity was defined as positive affect, warm sensitivity, and contingent responsiveness (Miller-Loncar, Landry, Smith, & Swank, 1997),

The proposed conceptual model does not assess all the hierarchical levels of interaction within the systems proposed to be involved in the individual child's development according to the developmental psychobiological systems view. Yet, according to Magnusson and Cairns (1996), a study does not have to assess all levels

given the limitations in tools and resources. They suggest that except in unusual circumstances, investigators are expected to simultaneously assess only two or possibly three levels of influence (Magnusson & Cairns, 1996). The conceptual model underlying the proposed study allows for this through assessment of a factor intrinsic to the child, temperament, as well as factors thought to influence the mother's behavior in the interaction, early relationship history and concepts of child development.

Early Childhood Development and Caregiver-Child Interaction

Why attend to parental interaction in a discussion of early childhood development? As is well known, the infant is born at a state of development that is incompatible with survival without a caregiver. Although the infant is born with potential for optimum development into a healthy, functional adult (within its psychobiological and environmental constraints, of course), such development cannot proceed except through the caregiving relationship. As discussed earlier, Sameroff and Chandler (1975) proposed that it is the ongoing transactions between the child and the environment that prescribe the arc of the child's developmental trajectory. This view has been echoed by others (Belsky, 1984; Sroufe, 1979, 1989; Sroufe & Rutter, 1984). These transactions, at least in early development, are most saliently mediated through the caregiving relationship (Sroufe, 1989).

As in the Barnard Model (Sumner & Spietz, 1994a), the caregiving relationship that is thought to lead to optimal child development features sensitivity on the part of the caregiver (Belsky, 1984; Emde, 1989; Lamb & Easterbrooks, 1981; Sroufe, 1979, 1989). Lamb and Easterbrooks (1981) defined caregiver sensitivity as providing responses to the infant's cues or needs that are contingent, appropriate, and consistent. One can see the

similarities between this definition and that provided in the Barnard Model. Furthermore, as in the Barnard Model, there is acknowledgement of a spectrum of clarity in infant cues and the changing levels of needs depending upon stage of infant development (Lamb & Easterbrooks, 1981).

Lamb and Easterbrooks (1981) further suggest that sensitive adult behavior occurs through a process that requires perception of the infant's cue or need, correct interpretation of this cue or need, selection of an appropriate response, and effective implementation. Again, the congruence between this process and that which defines sensitivity to cues and alleviation of distress in the Barnard Model is clear. Such sensitivity is proposed to influence infant cognitive development through fostering the infant's awareness of themselves as effective agents in interaction and through the creation of infant expectations regarding the behaviors of others with whom they interact. Furthermore, it is through infant provision of contingent responses (such as eye contact and, later, smiling) to caregiver behaviors that caregivers, in turn, develop a sense of efficacy. This growing mutual sense of interpersonal efficacy between caregiver and infant is thought to contribute to successful dyadic interaction throughout the developmental transitions of infancy and early childhood (Lamb & Easterbrooks, 1981).

The transition from early infancy through early childhood (and eventually adolescence and adulthood) is typically marked by movement from a state of relative dependence to one of increasing independence. Essential to this normative transition is the emergence of an organized sense of self (Sroufe, 1989). For example, in regard to feeding, the infant's recognition that crying when hungry leads to feeding will typically progress to the toddler's recognition of self-efficacy in which they can get food by asking

for a snack when they are hungry. Sroufe (1989) also suggested that this emergent sense of self is subject to varying degrees of distortion through the influence of problems in prior dyadic organization.

From a developmental perspective, the self is thought to originate and grow from the organization of the caregiver-infant dyad (Sander, 1975, 1985; Sroufe, 1989). In reflecting on his prior work and that of his colleagues, Sander (1975) articulated a progressive series of adaptive issues in infant-caregiver interaction that, as negotiated, support the ongoing emergence of the child's sense of self from the infant-caregiver dyadic relationship. These issues of mutual adaptation will be discussed in turn.

The first issue is 'basic regulation,' occurring during the first three months of life (Sander, 1975). In this phase, the caregiver, to a greater or lesser degree, comes to recognize the rhythmicity of the infant's basic physiological functions, such as eating, sleeping, and elimination. The caregiver's task is to act in ways that increase their sense of efficacy in responding to the infant's needs while also supporting the infant's initial determinations of self-regulation (Sander, 1975).

The next issue is 'reciprocal activation,' occurring during the next three months of life (Sander, 1975). This phase is marked by its increase in active infant participation in interactions with the caregiver which are increasingly contingent and social in nature. Sroufe (1989) suggested, however, that the appearance of increasing reciprocity is created largely through caregiver responsiveness to infant behaviors. The caregiver creates "an organized system of coordinated behavioral sequences around the infant" in which the infant can participate but not achieve independently (Sroufe, 1989). This phase is important because these organized interactional sequences set the stage for increasing

infant initiation later and these interactions are typically characterized by mutual pleasure that shapes the infant's emerging representation of the caregiver (Sroufe, 1989).

The third issue, 'infant initiative,' typically emerges during the third three months of life (Sander, 1975). This is the time when infant initiation of social interactions and beginning explorations of the environment become more prominent. By this point, 24-hour state regulation in the infant has typically been established in dyadic adaptation, freeing the infant to initiate activities directed toward or away from caregivers (Sander, 1975; Sroufe, 1989). However, in the event of a disruption in infant state or caregiving environment, regulatory needs would supercede the emerging infant initiatory actions (Sander, 1975).

During age 10-13 months, 'focalization' becomes the next salient issue (Sander, 1975). This issue is notable for the infant's focus on the primary caregiver, testing her availability and responsiveness to direct bids for attention (Sander, 1975). There is a sense of testing the caregiver to assure that, even though the infant is interested in wider exploration of the environment, the caregiver will remain accessible and responsive when the infant needs to return 'home' from exploring (Sroufe, 1989).

'Self-assertion' becomes the prominent adaptational issue from 14-20 months of age (Sander, 1975). Having successfully managed focalization, the child begins to determine and follow through with his own initiatives, even if these at times run counter to the desires of the caregiver. The contrary initiations are balanced, however, by ongoing bids for reciprocal interactions with the caregiver. Achievement of self-directed goals becomes pleasurable and at times is greater than the prior pleasures taken in reciprocal coordinated interactions with the caregiver (Sander, 1975).

The period from 18-36 months of age encompasses two adaptational issues: 'recognition' and continuity' (Sander, 1975). Recognition is thought to arise largely from the child's capacity for symbolic representation through language and the new level of communication this allows between caregiver and child. The child is able to communicate inner experience, feelings, and intentions and the caregiver can confirm these, spurring the beginning of self-recognition in the child. This self-recognition grows from the realization by the child that his inner awareness can be shared with the caregiver through communication. Sander (1975) asserted that this allows the beginning awareness of a "self-organizing core within" that, from the beginning, has coordinated biological rhythms and now can assume a greater role in behavioral regulation.

The second adaptational issue during this time is 'continuity.' Sander (1975) suggested that this is a time of intentional aggressiveness and destruction, in which the child actively disrupts previously facilitative and synchronized interactions with the caregiver. It is through reconciliation with the caregiver, either through child initiative or child acceptance of caregiver bids to reestablish harmony, that the child learns that the relationship and his "self-organizing core" have continuity (Sander, 1975).

Successful negotiation of these issues of recognition and continuity allows for ongoing sensitive coordination of interactions, but now the interactions are coordinated by partners who are both able to recognize themselves and their partner as separate individuals (Sroufe, 1989). Implications of and articulations between this progressive series of adaptive issues and developmental tasks of feeding in early childhood will be considered as they arise below.

Normal Development in Early Childhood Feeding and Growth

Failure to thrive (FTT) and early childhood obesity represent maladaptive behavioral deviations from a normal pattern of development. An understanding of what is expected in normal developmental progression in feeding and growth during childhood helps to clarify these deviations.

Physical Growth

Birth weight generally doubles by four to six months and triples by one year in the infant, slows to an average yearly gain of 4.4-6.6 pounds per year during toddlerhood, and slows somewhat further during preschool age (three to six years), with an average yearly gain of 4.5 pounds (Behrman, Kliegman, and Jenson, as cited in Dunn, 2004). From age six to twelve years the average weight gain is seven pounds. During adolescence, girls (age 10-14 years) can be expected to gain an average total of 39 pounds and boys (age 12-16 years) can be expected to gain an average total of 50 pounds. Adiposity, a measure of body fat, typically increases during the first year of life and then steadily decreases until a rebound at around six years old with a steady increase through adolescence (Rolland-Cachera et al., 1984).

Developmental Tasks in Feeding during Early Childhood

Satter (1995) recently reviewed feeding dynamics in childhood and articulated the salient developmental tasks of feeding in early childhood. Accordingly, during birth to 2-3 months of age, the infant's primary task is to achieve state regulation. In the domain of feeding, infants must be alert enough to make their needs known and engage their parents. This very closely parallels the timing and content of 'basic regulation' in Sander's (1975) series of adaptive issues. The caregiver must be able to recognize and

adapt to the child's periodicity of feeding needs and it is through this successful adaptation that the infant is supported in state self-regulation. Children are able to self-regulate their intake to promote and sustain growth from a very early age, as evidenced by study findings for two groups of infants (Fomon, Filmer, Thomas, Anderson, & Nelson, 1975). By six weeks of age, the infants were able to regulate their formula intake to achieve similar mean caloric intakes and rates of weight gain within a few weeks despite the fact that one group consumed 54 kcal/100 ml formula and the other consumed 100 kcal/100 ml formula.

Between 2 and 6 months of age, feeding becomes more salient as an avenue toward emotional attachment between infant and parent (Satter, 1995). This period parallels Sander's (1975) adaptive issue of 'reciprocal activation.' Given that this is a time in which interactions are often characterized by mutual pleasure which shapes infant conceptions of the caregiver (Sroufe, 1989), it is not surprising that feeding, an interaction that would occur several times daily at this age, would serve as an important pathway toward emotional attachment. Ainsworth and Bell (1969) provided an insightful initial description of mother-infant feeding interaction among the 26 mother-infant dyads of the classic Baltimore attachment study. They reported that the majority of the babies that would later (at 1 year of age) be classified as having secure attachments to their mothers were members of mother-infant dyads in which mothers were sensitive and responsive in earlier feeding interactions. These mothers typically allowed infant behavioral cues to determine the initiation, pacing, and termination of feeding.

The second six months of an infant's life are characterized by the beginning of awareness of separateness from the caretakers and the beginning of somato-psychological

differentiation, in which the infant begins to differentiate inner feelings and sensations as well as their causes and solutions (Satter, 1995). This means that the infant begins to recognize hunger as hunger, rather than some general sensation, and communicates the need to eat to the caregiver in order to resolve the hunger. During this same time period, according to Sanders (1975), the infant and caregiver are negotiating the adaptive issues of 'infant initiative' and 'focalization.' In regard to feeding, one would expect that the infant would be demonstrating a readiness to explore the environment and one way to do this would be through trying new foods. It is interesting to note that it is typically around 6 months of age that children are being introduced to a variety of new foods. Perhaps this is in part due to this emergence of infant initiative at this time. In regard to the issue of focalization and feeding, one would expect to see increasing infant testing and demands of the primary caregiver during feeding between 10 and 13 months of age. One might expect that the infant would demonstrate an unwillingness to try new foods during this time or even some resistance to liked foods unless the feeding is performed by the primary caregiver or he or she is close by.

Between 12 and 36 months, toddlers are thought to need the structure of regularly scheduled meals and snacks, with caregiver resistance to food begging between these meals and snacks (Satter, 1995). This is a time of exploring and testing limits, including access to food. During this time period, according to Sander (1975), the caregiver-infant dyad is first dealing with 'self-assertion' between 14 and 20 months, and with 'recognition' and 'continuity' between 18 and 36 months. During the period of self-assertion, one might expect to see the child more actively seeking food at times not heretofore designated as mealtimes, reaching for food at mealtimes, and attempting self-

feeding, even if these attempts run counter to the caregiver's wishes. However, one would also expect to see balancing of these contrary initiations through child attempts to engage in reciprocal feeding interactions with the caregiver.

Between 18 and 36 months, in light of the issues of 'recognition' and 'continuity,' one would expect to see more verbal communication used in feeding interactions and children verbally asserting their desires to feed themselves. One might also expect to see more aggression and destructive behavior in feeding interactions, such as throwing food, than previously experienced in such interactions. During such interactions, one would eventually see attempts at reconciliation by one or both partners, as well. Successful negotiation of these developmental tasks and adaptive issues of early childhood should support healthy feeding behaviors later in childhood. This view is echoed by Satter (1995) who asserts that, during preschool age, if previous developmental tasks have been met, children will develop a positive sense of self, eager to learn about new foods and eating situations. Although food intake from meal to meal may vary considerably among young children, research has shown that daily energy intake remains relatively constant because children will adjust their intake to their needs throughout the day (Birch, Johnson, Andresen, Peters, & Schulte, 1991).

These findings support previous research conducted by Davis in the 1930s. Davis (1939) studied 15 children, beginning at ages ranging from 6-11 months and following these children for 6 years. The focus of the study was on the health and nutrition of children who self-selected diets. Four of the children were found to be malnourished and underweight; five had rickets (Davis, 1939). Children had never eaten solid foods prior to the study. The children were served "both sweet and sour (lactic) milk, two kinds of

cereals, animal protein foods, and with fruit or vegetables" (Davis, 1939, p. 257) four times daily initially and three times daily later in the study. The food was not seasoned in any way although the children could season food as they wished. The children decided how much, what combination, and what style of eating with which to eat, assisted but not directed in any way by a nurse. Caloric intake was within recommended guidelines and it was noted that within 6 months of the initiation of the study no child was "noticeably fat or thin" (Davis, 1939, p. 259). Nutritional quality and balance according to the recommended dietary allowances of the time were also met despite the fact that no single diet resembled any of the others.

Davis (1939) suggested that one of the keys to achievement of this high level of health and nutrition lay in the provision of "natural, unprocessed, and unpurified foods" (p. 261) from which the children could choose. Finally, she concluded that the provision of conditions in which children could respond to internal cues of appetite, hunger, and satiety eliminated anorexia and eating problems commonly associated with feeding prescribed amounts of various foods (Davis, 1939). Although the findings reported by Davis (1939) and Birch et al. (1991) must be viewed with caution given their respective sample sizes of 15 children, these finding are compelling in light of their consistency over 5 decades apart.

Development of Food Preferences

Food preferences are thought to emerge through interactions between genetic predispositions and the eating environment (Birch, 1999). Perusse and Bouchard (1994) reported that approximately 80% of variation in food preferences in families is accounted for by cultural and environmental factors with only relatively minor genetic effects.

Nevertheless, according to Birch (1999), there are constraints to food preferences that are at least initially mediated through genetic predispositions. Initially, infants are predisposed to prefer sweet and/or salty foods over sour and/or bitter foods (Birch, 1999). For example, most infants would initially respond more positively to cake icing than to unsweetened lemonade.

Another predisposition of early childhood is neophobia in regard to foods, with initial rejection of new foods and learned preference for foods that are more familiar (Birch, 1999). In her review of literature regarding food neophobia, Birch (1999) concludes that there is likely a curvilinear relationship between age and the neophobic response, with this response being minimal in infancy, increasing through early childhood, and then declining after early childhood into adulthood. Finally, Birch (1999), states there is a predisposition to learn food preferences through associations between foods and the contexts and consequences of their ingestion. A common example of this is the development of an aversion to a particular food, even one that may have been initially well-liked, if illness is closely associated with the timing of ingestion of that food.

Children learn to prefer versions of food that are energy-dense compared to energy-dilute (Birch, 1999). This preference is thought to arise from genetic predispositions that were adaptive in environments in which energy-dense foods were scare, which was historically the case for most food environments (Birch, 1999). However, energy-dense foods are ubiquitous in most of the Western world today. One can see how a learned preference for energy-dense foods is related to obesity. Energy-dense foods carry more calories for their volume than other foods. Examples include foods that are high in fat and simple sugars, such as chips, ice cream, and candy. Such

foods are more available in the current eating context than they have ever been in the past.

Birch (1999), in reviewing recent research, concluded that typical practices used to encourage child consumption of disliked foods increase dislike for those foods. At the same time, practices that restrict children's access to foods high in energy density, sugar, salt, and fat enhance children's desire for and intake of those foods, particularly when the child is unmonitored. In other words, restriction to access does not appear to facilitate the development of self-regulation in eating that will protect against obesity.

Feeding Problems in Early Childhood

The Diagnostic and Statistical Manual of Mental Disorders (DSM-IV-TR) defines feeding disorder of infancy or early childhood as having four characteristics. These include: (a) a feeding disturbance manifested by persistent inadequate eating with a significant failure to gain weight or loss of weight over 1 month; (b) not due to gastrointestinal or other medical condition (e.g., gastroesophogeal reflux); (c) not accounted for by mental disorder or lack of available food; and (d) onset before age six (American Psychiatric Association, 2001). The Diagnostic Classification of Mental Health and Developmental Disorders of Infancy and Early Childhood (DC:0-3) defines an eating behavior disorder as being present when an infant or young child (a) shows difficulties in establishing regular feeding patterns with adequate or appropriate food intake (e.g., nonorganic failure to thrive); and (b) does not regulate his or her eating in accordance with physiologic feelings of hunger or fullness (Zero to Three/National Center for Clinical Infant Programs, 1994). The DC:0-3 classification specifies that a primary diagnosis of eating behavior disorder should not be made if eating difficulties:

(a) have clearly associated sensory reactivity or processing and/or motor difficulties; (b) are part of a larger symptom picture, associated with other affective or behavioral disturbances related to primary relationships, trauma, or other adjustment difficulties; or, (c) if irregular eating patterns or severely constricted food choices are part of a multisystem developmental disorder and related patterns of rigidity and inability to take in new experiences (Zero to Three/National Center for Clinical Infant Programs, 1994).

Satter (1990) proposed that overeating as well as undereating be included in the list of problematic feeding interactions in childhood. Two of the most serious consequences of feeding problems in early childhood are (FTT) and obesity. When feeding problems that lead to undernutrition are identified, they are quite stable from 10 months to 2 years (Hagekull et al., 1997). Recent preliminary data point to a potential stability for overnutrition as well (Stettler, Zemel, Kumanyika, & Stallings, 2001).

Benoit (2000) concluded from her review of definitions that FTT is present if there is at least a one month history of (1) weight $\leq$ the fifth weight percentile for age on standardized growth charts and/or (2) a weight deceleration (downward crossing of at least two major percentiles) since birth, and (3) weight for height age less than 90%. A 1995 report from the Federation of American Societies for Experimental Biology, Life Sciences Research Office (Kessler & Dawson, 1999) noted that data from the National Health and Nutrition Examination Surveys of 1971-74, 1976-80, and 1988-91 demonstrated that the prevalence of inadequate growth among 2- to 5-year olds remained relatively close to 5% without major fluctuations. The consequences of feeding disorders and FTT are potentially quite serious. These include impaired immune system development, reduced neural growth, delayed neural maturation, decreased intelligence,

and behavioral and socioemotional problems (see (Benoit, 2000), for review). Among the multifactorial contributions to this problem, the feeding interaction is considered a crucial arena for early intervention. Through the proposed study, an assessment of the foundational patterns of feeding interactions that may contribute to such problems and/or result from them will be further developed.

Early childhood obesity is a growing problem in this country (Mei et al., 1998; Ogden et al., 1997). Among low-income preschool children, there was an increase from 18.6% to 21.6% at the 85th percentile cutoff for weight and from 8.5% to 10.2% at the 95th percentile cutoff, between 1983 and 1995 (Mei et al., 1998). Childhood (5-17 years) obesity has been associated with the serious physical consequences of hypertension, dyslipidemia, hyperinsulinemia, and orthopedic problems (Freedman et al., 1999). Specifically, compared to peers below the 85th percentile, those above the 95th percentile for weight were more than twice as likely to have elevated total cholesterol and 12.6 times as likely to have fasting hyperinsulinemia. Their diastolic blood pressures were elevated and they were 4.5 times as likely to have elevated systolic blood pressures. Clinically, social rejection and low self-esteem are considered to be the major psychosocial consequences of obesity (Dunn & Evers, 1996).

Children do not outgrow obesity or its consequences; instead, it tends to track into adulthood. A recent study confirmed this link between obesity during toddlerhood (1-2 years) and adolescence (15-17 years) and the risk for adult obesity (Whitaker, Wright, Pepe, Seidel, & Dietz, 1997). The trajectory of overweight from infancy to childhood was recently made most clear by the finding that rapid weight gain in the first four months of life was associated with increased risk of overweight at 7 years of age (Stettler et al.,

2001). This negative trajectory was further emphasized recently by findings that 77 % of children (N = 2617) with a BMI greater than the 95th percentile remained obese as adults (Freedman et al., 2001).

Maternal-Child Interactions and Feeding Problems of Early Childhood

The interaction during feeding is thought to be a significant context for both childhood FTT and obesity. The feeding interaction is the focus for the proposed study because it is readily amenable to intervention by nurses and other early intervention specialists. The need to address the feeding interaction typically becomes clear once a child begins to show problems of under- or overnutrition on standard growth charts. Yet clinicians could also be proactive by assessing mother-child dyads early and optimizing those interactions when indicated.

Failure to Thrive

The relationship between maternal-child interaction and undernutrition (FTT or feeding problems that contribute to FTT) has been the subject of much research (Benoit, Madigan, Lecce, Shea, & Goldberg, 2001; Chatoor et al., 2000; Chatoor, Hirsch, Ganiban, Persinger, & Hamburger, 1998; Coolbear & Benoit, 1999; Hagekull et al., 1997; Lucarelli, Ambruzzi, Cimino, D'Olimpio, & Finistrella, 2003; Ward, Kessler, & Altman, 1993). Of particular interest to the proposed study are associations between problematic dyadic interaction and FTT , with mothers reporting less positive perceptions of parenting (Lindberg et al., 1994), increased stress (Ward et al., 1993), and insecure or dismissing early relationship attachment with their own primary caregivers (Chatoor et al., 2000; Coolbear & Benoit, 1999; Ward et al., 2000), as well as observational findings for maternal behavior characterized by less sensitivity (Chatoor et al., 1998; Coolbear &

Benoit, 1999; Hagekull et al., 1997; Lucarelli et al., 2003; Ward et al., 1993) and more controllingness (Chatoor et al., 1998; Lucarelli et al., 2003). Child characteristics that contributed to problematic interactions in these studies include difficult temperament (Chatoor et al., 2000; Hagekull et al., 1997; Lindberg et al., 1994) and less secure attachment (Coolbear & Benoit, 1999; Ward et al., 1993; Ward et al., 2000).

A study by Lucarelli et al. (2003) is similar to this study in several ways. It assessed feeding interaction quality between mothers and children during the same age period of the child as the proposed study and it also utilized observational coding of videotaped feeding interactions to rate interaction quality. The study's sample consisted of 104 mother-infant dyads with children aged 2-36 months. Sixty-one percent of the infants were female and the dyads were primarily middle-to-upper class. The study used a cross-sectional design with feeding interactions videotaped and coded. The sample was split into three groups: a) children with no feeding and/or growth problems (41 children); b) children with a feeding disorder and/or organic FTT (29 children); and, c) children with a feeding disorder and/or non-organic FTT (34 children).

This study used the Feeding Scale (Chatoor et al., 1997) to code the videotaped interactions. The Feeding Scale assesses mother-infant dyads from child ages of 1 month to three years. It is a global rating scale of 46 items that group under five subscales: 1) dyadic reciprocity, 2) dyadic conflict, 3) talk and distraction, 4) struggle for control, and 5) maternal non-contingency (Chatoor et al., 1997). The two groups with feeding disorders or FTT (organic or non-organic) were compared to the control group. Analysis revealed the groups with feeding disorders obtained lower scores in dyadic reciprocity, indicating relatively poor dyadic synchronicity and mutuality (Lucarelli et al., 2003).

These two problem groups were also significantly higher in dyadic conflict, struggle for control, and maternal difficulty in recognizing, understanding, and responding contingently to their child's cues (Lucarelli et al., 2003).

Early Childhood Obesity

Individual heritability of variation in obesity-related phenotypes is acknowledged (Allison et al., 1996) and specific gene pathways toward the development of obesity have been and continue to be discovered (see Schonfeld Warden & Warden, 2001 for a recent review). The following review explores the potential impact of parenting on the development of self-regulation in eating and how maladaptive self-regulation may contribute to obesity in early childhood.

As noted earlier, Johnson and Birch (1994) investigated the ability of 3-5 year old children to self-regulate energy intake and how this was related to body weight. Several findings from this study were notable. First, boys were found to compensate for a significantly greater proportion of energy intake than girls (55% vs. 35%, respectively). Fatter children also demonstrated poor compensation for energy intake when compared to their thinner peers. Parental disinhibition in their own eating behaviors was linked to having children who demonstrated problems in adjusting their eating to energy density. In addition, higher degrees of control in maternal feeding practices were associated with children who were less responsive to energy density. That is, these children, despite having consumed a recent snack of the same caloric density as the one consumed by their peers, would consume more calories than their peers whose parents had less difficulty in stopping eating themselves and who reported using less control in feeding their children. Further, mothers who used high levels of cognitive restraint to control their own eating

had girls who were less able to compensate for energy density in their diet, although the opposite was true for boys.

A model including parental control, maternal restraint, maternal restraint by child's sex interaction, and child's sex as covariate accounted for 66% of the variance in the child's ability to compensate for energy density in food intake for a subsample of 47 families for whom complete data was available. Sex differences in the children's ability to compensate for energy density were hypothesized to occur because of differences in the way that boys and girls are parented regarding eating (Johnson & Birch, 1994). This study is important because it addresses not only parental feeding practices but also the potential impact of parental role modeling through disinhibited eating. One may consider this in light of the phrase, "Do as I say, not as I do." Whereas this study provides some compelling data about the influence of parents on child self-regulation around eating, it has some limitations. Generalizability is limited to middle-class Caucasian families and parents who were more highly educated. The data were also gathered at one time point and previous research has shown that children's intake may vary widely over time even if their daily intake remains relatively constant (Birch et al., 1991). Finally, the associations between parental influences and child self-regulation were correlational and thus causality cannot be inferred. Nonetheless, the findings are compelling in light of other studies.

Fisher and Birch (1999) conducted two experiments to test whether restricting access to a palatable food would increase children's attention to, desire for, and consumption of that food. In the first experiment, the eating behavior of 3- to 5-year-old children (N = 31) was assessed before, during, and after 5 weeks of restricted access to a

palatable food. The experimental foods were two fruit bar cookies for which the children showed no prior preference or dislike. During the restriction period, children had free access to one of the cookies (the control) and restricted access to the other cookie (the target), which was placed in a transparent jar at their table. No initial differences in responses to the target and control foods were noted. However, during the restriction period, the children had higher behavioral responses to the target food compared to the control food. In other words, they talked about the target food more, made more requests for it, and attempted to get it more often. Three weeks after the period of restriction, there were no significant differences in responses to either the control or the target food.

In the second experiment, the selection of, ingestion of, and behavioral response to a palatable food was measured in 3- to 6-year-old children (N = 40). Children participated in eight snack sessions total. Four were unrestricted, in which the restricted food (target) was available ad libitum along with a slightly less favorable food (control), and four sessions were restricted, in which access to the restricted food was limited and access to the slightly less favorable food was not. In the restricted sessions, children had access to the target food only during the second 5 minutes of three 5-minute intervals measured across 15 minutes. The children demonstrated greater behavioral response to the target food during the restricted sessions compared to the unrestricted sessions. Children also consumed more of the target food during the restricted session compared to the unrestricted session. Finally, greater increases of child selection of target food was correlated with higher levels of maternal restriction of access to the target food at home (Fisher & Birch, 1999).

The authors concluded that the restriction of access to palatable foods may interfere with a child's ability to exercise self-regulation in the presence of palatable, restricted foods and this may, in turn, contribute to the problem of children becoming overweight. This study's generalizability is also limited due to the relative homogeneity of the sample in terms of ethnicity, relatively high parental education, and relatively high parental employment status. However, the use of a longitudinal experimental design with pretest and posttest washout period strengthens the argument that psychosocial factors, such as restriction or control of access to palatable foods, may influence a child's ability to self-regulate in eating.

Finally, although there is research that demonstrates a degree of heritability for sensitivity to hunger, satiety, and food intake (De Castro, 1999), it is important to note that self-regulation among preschool age children can be improved (Johnson, 2000). Twenty-five children completed a study in which baseline self-regulation of energy was assessed, a six-week intervention designed to sensitize children to their internal cues of hunger and satiety was provided in developmentally appropriate ways, and post-intervention self-regulation of energy was then assessed. After the intervention, children who both undercompensated and overcompensated in energy self-regulation improved. Prior to the intervention, significant positive correlations were noted between mothers who were disinhibited in their own eating and children who demonstrated difficulty in energy intake self-regulation. A significant positive correlation was also found between mothers who practiced greater cognitive restraint over their own eating and daughters who demonstrated difficulty in energy intake self-regulation. These data regarding maternal and child eating behaviors are consistent with those of Johnson and Birch

(1994). It is important to note that the relations between mothers' and children's' eating patterns were no longer significant after the intervention. Thus, intervention with young children designed to improve sensitivity to internal eating cues may be an important part of a broader early intervention with families regarding early childhood feeding.

Summary

While a variety of theoretical approaches to parent-child interaction could be taken, the proposed study is guided by a bidirectional conceptual model that is responsive to the demands of an epigenetic approach to early childhood development. This model focuses on the quality of the dyad's interaction rather than individual behaviors in isolation. In addition, the model considers factors thought to influence the interactive behaviors of each partner. Successful negotiation of progressive adaptive issues of development faced by the child-caregiver dyad supports the child's transition from dependency in feeding during infancy to relative independence during toddlerhood. The quality of dyadic interaction is considered central to this success.

In considering the ways that early experiences with food and eating shape later child self-regulation of eating, Birch and Fisher (2001) suggest that the balance of control in parent-child feeding interactions has a formative influence on this later self-regulation through the interplay between parent-provided structure in the interaction and allowance for the child's level (ever emerging) of autonomy in eating. They also suggest that parental control, through excessive pressure to eat certain "healthy" foods and restrict "unhealthy" others, may lead to a limitation rather than expansion of child eating choices and a shift away from the child's reliance on internal cues of hunger and satiety to determine the initiation and termination of eating. This contributes to the undermining of

the child's ability to self-regulate eating in ways (given the studies by Davis (1939), Fomon et al. (1975), and Birch et al. (1991)) that should contribute to optimal growth and development within the constraints of the child's psychobiological capacities and the capacity of the environment to respond to the changing developmental needs and capabilities of the child over time.

Specific Aims

In this study, a secondary analysis of mother-toddler feeding interactions (N = 116), videotaped at 12, 24, and 36 months as part of a longitudinal, observational study, was conducted to carry out the following specific aims:

1) to assess the reliability and validity of NCAFS assessment at 24 and 36 months; and,

2) to assess how maternal characteristics (relationship history of parental care and overprotection/control and beliefs related to child development) and a child characteristic (temperament) contribute to variations in feeding interactions, initially at 12 months and at 24 and 36 months if NCAFS reliability and validity are established.

CHAPTER III

METHODS

The research entailed an analysis of existing data collected in a larger longitudinal, observational study that assessed mother-child control-salient interactions at 12, 24, and 36 months (Houck, 1999). Concurrent and predictive relationships were examined among the interactions, maternal and child characteristics, and child outcomes of self-concept and social competence. The original sample consisted of 162 mother-infant dyads recruited from a Family Practice Clinic and by word of mouth prior to the infant's age of 8 months. There is complete self-report and observational data at 12, 24, and 36 months for 116 of the original 162 dyads.

Sample

All initial demographic data were collected via maternal self-report using a questionnaire at intake, when the children were eight months old. Data were updated at each subsequent follow-up visit. Maternal demographic data included ethnicity, age, education level, parity, marital status at intake, change in marital status at 36 months, maternal employment at intake, maternal employment at 36 months, income category at intake, and income category at 36 months. Data on reported primary caregiver for the child and use of daycare were also collected. Child demographic data include gender, birth term status, and newborn difficulties during the first few months of life.

Maternal Demographics

Mothers were primarily Caucasian (n = 91) (Table 1). Twenty-one mothers were African-American and four mothers were of other ethnic background. The proportion of African-American mothers (18.1%) represents over twice the proportion of African-

Americans in the county at the time of data collection (7.6%). At intake, maternal age ranged from 17- 47 years, with a mean of 28.3 years (SD = 7.5). The majority of women were in their twenties and thirties. However, fourteen mothers were teenagers at the time of intake and sixteen were in their forties.

In regard to educational status at intake, one fourth of the mothers had not completed high school compared to one third who had. Another third had attended at least some college (36.2%) with 20 (17.2% of the overall sample) of those college graduates. Thus, nearly three fourths of the mothers were at least high school graduates. See Table 1.

At intake, 54.3% of the mothers (n = 63) were employed. By the end of the study, this proportion had risen to 60.3% (n = 70). As seen in Table 1, over half of mothers (50.9%) reported income of less than $17,000 at intake. Those reporting income between $18,000 and $28,000 comprised approximately one-fifth of the sample (20.7%) with the remainder (28.4%) reporting income greater than $29,000.

Well over half of the mothers (63.8%) were married at the time of intake. In addition, 11 of the mothers (9.5%) were either living with a partner or in common law marriages. Nineteen percent of the mothers had never married and nine (8.8%) of mothers were either separated or divorced. None of the mothers were widowed at the time of initial data collection. At 36 months of child age, the majority of mothers (79.3%) reported no change in their marital status since intake. Fifteen (12.9%) were now either separated or divorced and five (4.3%) reported increased marital conflict (Table 1). For nearly fifty percent of mothers, the child in the study was their first child. Only eight mothers had more than three children.

Table 1

Selected Maternal Demographics ($N = 116$)

Characteristic	*n*	%
Ethnicity		
Caucasian	91	78.4
African American	21	18.1
Other (Native American, Asian, Hispanic)	4	3.4
Education level		
Grade School	27	23.3
High School	42	36.2
Some College	22	19.0
College Graduate	20	17.2
Income Category at Intake		
< $5000	14	12.1
5-11,000	20	17.2
12-17,000	25	21.6
18-23,000	17	14.7
24-28,000	7	6
> 29,000	33	28.4

(Table 1 continues)

(Table 1 continued)

Characteristic	*n*	%
Marital status at intake		
Never married	22	19
Currently married	74	63.8
Common Law Marriage/Cohabitating	11	9.5
Currently separated	3	2.6
Divorced	6	5.2
Change in marital status at 36 months		
None	92	79.3
Increased marital conflict	5	4.3
Separated	11	9.5
Divorced	4	3.4
Common law marriage/cohabitation	2	1.7
Married	1	.9
Parity		
Only child	56	48.3
Two children	30	25.9
Three children	21	18.1
Four children	3	2.6
Five children	5	4.2

Note. Balance represents missing data ($N = 116$).

Child Characteristics

There were proportionately more male than female children in this sample (Table 2). This is consistent with the male to female sample ratio from the larger study. The Family Practice Clinic from which most subjects were recruited was the sole provider of circumcision services at OHSU hospital and clinics. Therefore, more male children were available for recruitment. Recruitment of all possible female children did not compensate for male comparative overrepresentation. This was unanticipated in the larger study and, due to this study's reliance on data from the larger study, efforts to equalize numbers of males and females were not possible.

The majority of infants (87.9%) were full-term. In the larger study, most preterm infants were considered to have "corrected" developmentally at age 12 months and were assessed at their birth age of 12 months rather than gestational age. Twenty-one mothers (18.1%) reported some type of problem in the first few months of the child's life with either the child or the mother. Of those 21, only five reported some early difficulty with feeding, including difficulty breastfeeding, difficulty adjusting to formula, or vomiting.

Table 2

Child Characteristics ($N = 116$)

Characteristic	*n*	%
Gender		
Male	76	65.5
Female	40	34.5
Term Status		
Full term	102	87.9
Premature	14	12.1

Child Care Characteristics

The majority of mothers reported themselves to be the primary caregivers for their children at intake and throughout the rest of the study period (Table 3). Both parents were the next most common designation as primary caregiver at 12 and 24 months. Paternal designation as primary caregiver remained relatively stable over time, with a low of two at intake and a high of six at 24 months. The same was true of grandmothers, with a low of one at intake and a high of four at 24 months. Other relatives and others accounted for a relatively small percentage of primary caregivers at any time period.

The majority of children were not in daycare over the course of the study. More children were enrolled in daycare at 24 and 36 months compared to 12 months with a peak (42%, $n = 49$) at 24 months.

Table 3

Child Care Characteristics ($N = 116$)

	Intake	12mos	24mos	36mos
Characteristic	*n* (%)	*n* (%)	*n* (%)	*n* (%)
Primary Caregiver				
Mother	99 (85.3)	93 (80.2)	101 (87.1)	107 (92.2)
Father	2 (1.7)	4 (3.4)	6 (5.2)	4 (3.4)
Grandmother	1 (.9)	2 (1.7)	4 (3.4)	2 (1.7)
Both parents	12 (10.3)	16 (13.8)	--	--
Other relative	1 (.9)	--	1 (.9)	1 (.9)
Other	--	--	3 (2.6)	2 (1.7)
Missing data	1 (.9)	1 (.9)	1 (.9)	--
Daycare				
No	--	80 (69)	66 (56.9)	71 (61.2)
Yes	--	35 (30.2)	49 (42.2)	45 (38.8)
Missing data	--	1 (.9)	1 (.9)	

Study Measures

The study involved two observational measures [the Nurse Child Assessment Feeding Scale (NCAFS) (Sumner & Spietz, 1994a) and the Snack Scale (Houck & Spegman, 1999)] and three maternal report measures [the Parental Bonding Instrument (PBI) (Parker, Tupling, & Brown, 1979), the Concepts of Development (COD) scale (Sameroff & Feil, 1985), and the Toddler Temperament Questionnaire (TTQ) (Fullard,

McDevitt, & Carey, 1979)]. A central feature of the study was the extension of validity and internal consistency of the NCAFS from 12 months to 24 and 36 months of age. Validity study was carried out in relation to the Snack Scale. The scores from the NCAFS was subsequently assessed in relation to two maternal characteristics (early relationship history and beliefs related to child development) and child temperament.

Observational Setting

Mothers and their children were observed and videotaped through a one-way mirror in a laboratory setting. At 12 months of age, all children were placed in a high chair and the snack was brought in for the mother to facilitate feeding the child as she normally would. At 24 and 36 months, a child-sized table and chairs were made available for the mother and child and the snack tray was placed on the table between them. There were no toys or other play items available to the child during snack time. Instructions to mothers at every age observation were that the snack would serve as a break for mother and child, but the camera would continue recording. The feeding session ended when the mother said so or after 10 minutes. This setting is consistent with those typically used for feeding observations, including NCAFS.

Observational Measures

The Nursing Child Assessment Feeding Scale

The Nurse Child Assessment Feeding Scale (NCAFS) (Sumner & Spietz, 1994a) was used to assess the videotaped observations of feeding between mothers and their infants at 12, 24, and 36 months. The scale is currently considered reliable and valid for infants from birth to 1 year old. The research study aimed to extend the reliability and validity of the NCAFS to 3 years of age. The NCAFS is an observational measure of

interaction between caregiver and child during feeding. The assessment can take place in any setting and its duration is determined by the natural initiation and termination of feeding by the dyad.

The NCAFS consists of 76 binary items that are scored as presence or absence of behavior (See Appendix A). These 76 items are organized into six subscales that were conceptually derived through a "combination of intuitive and experienced judgment" of a collaborative group of nurses familiar with children and parents and psychologists with developmental psychology and observational methodology backgrounds (Barnard et al., 1989).

The four caregiver subscales include: I) Sensitivity to Cues, II) Response to the Child's Distress, III) Social-Emotional Growth Fostering, and IV) Cognitive Growth Fostering. The Sensitivity to Cues subscale is comprised of the first 16 items. Response to Child's Distress is assessed by the next 11 items. The Social-Emotional Growth Fostering subscale contains 14 items. And, the Cognitive Growth Fostering subscale contains 9 items. There are two child subscales: V) Clarity of Cues and VI) Responsiveness to Caregiver. The Clarity of Cues subscale is comprised of 15 items and the Responsiveness to Caregiver subscale is comprised of the final 11 items.

Scores for each of the subscales could range from zero, indicating that none of the item behaviors were witnessed, to the total number of questions in each subscale, indicating that all item behaviors in the subscale were noted in the interaction. The four caregiver subscale scores can be combined to create a caregiver total with a possible maximum score of 50. The two child subscales scores can be combined to create a child total with a possible maximum score of 26. These two total scores can also be combined

to create a dyad total with a maximum score of 76. A high score represents more optimal interaction between caregiver and child.

Data regarding mean scores and standard deviations for Caucasian, African-American, and Hispanic groups are available as are data concerning clinically significant tenth percentile cutoff scores for caregiver, child, and dyad totals for these ethnic groups (Sumner & Spietz, 1994a). The study assessed internal consistencies for all subscales, and used the Caregiver, Child, and Dyadic total scores for validity study. Cronbach's alphas for the Caregiver, Child, and Dyadic total scores are reported as .83, .73, and .86 respectively (Sumner & Spietz, 1994a).

Some of the items within each subscale are also specifically designated to assess behavioral contingency between caregiver and child. In the Sensitivity to Cues subscale there are six such items. In Response to the Child's Distress there are also six items. In Social-Emotional Growth Fostering and Cognitive Growth Fostering there are one and two items, respectively. In the child subscales of Clarity of Cues and Responsiveness to Caregiver there are three contingency items and these are all in the latter subscale. A caregiver total contingency score can be created by combining the contingency item scores from each of the four subscales for a possible maximum score of 15. The same is true of the child contingency items with a possible maximum score of three. Finally, a dyad contingency total score can be calculated combining all of the contingency items with a maximum possible score of 18. As with the overall scale, a high score represents more optimal interaction between caregiver and child.

Extensive validity study has been reported for the NCAFS caregiver, child, and dyadic scales (Sumner & Spietz, 1994a). Concurrent validity has been established with

Bradley and Caldwell's Home Observation for Measurement of the Environment (HOME) scale, *r*'s = .48, .36, and .54, on the caregiver total, child total, and dyad total scores respectively (Sumner & Spietz, 1994a). As Sumner and Spietz (1994) noted, these positive moderate correlations between the two scales are expected because, although the HOME is not particularly focused on feeding interactions it does address cognitive and social-emotional support of the infant. Higher quality interaction scores were related to greater cognitive and social-emotional support. Predictive validity was established between 10-month caregiver, child, and dyadic feeding scores and the 24-Month Bayley Mental Development Index (MDI), *r*'s = .47, .30, and .46 respectively (Sumner & Spietz, 1994a). Thus, higher quality interaction scores predicted higher degrees of cognitive development.

Discriminant validity was demonstrated in a range of studies, including those of infant temperament and its effect of social partners (Zeanah, Keener, & Anders, 1986), mother's interactive style (Houck, Booth, & Barnard, 1991), failure to thrive (Lobo, Barnard, & Coombs, 1992), and psycho-social high risk infants (Farel, Freeman, Keenan, & Huber, 1991). Zeanah et al. (1986), in a study of parental perceptions of infant temperament and their relation to maternal and infant behaviors, found a significant negative correlation ($r = -.58$, $p < .01$, $n = 22$) between maternally rated infant temperament and the NCAFS infant responsiveness to parent subscale. Infants who were maternally rated as temperamentally difficult were significantly less responsive to their parent during feeding. On the other hand, maternal perceptions of infant temperament were not significantly related to maternal behaviors during feeding. Houck et al. (1991), in a study of dyadic play behavior between 51 high-social-risk women and their children,

reported that mothers classified as intrusive on the Booth and Houck's (1986) Control-Autonomy Balance Scale (CABS) scored significantly lower than the other three groups on the NCAFS ($p < .001$). They also reported that children in the study classified as avoidant-compliant on the CABS had significantly lower scores on the NCAFS than other children. Lobo et al. (1992) found that the NCAFS was able to differentiate between non-organic failure to thrive subjects ($n = 5$) and normal control subjects (n = 17) with total scores of 51.8 vs. 60.8 respectively ($p < .05$). Of interest in this study was the finding that children designated as having organic failure to thrive ($n = 5$) were not significantly different from the control subjects in regard to their total NCAFS scores (59.4 vs. 60.8, respectively). This is as one might anticipate given an expectation that a likely reason for non-organic failure to thrive would be problematic dyad interaction. Farel et al. (1991), in a study of 37 high-risk mother-infant dyads matched against 37 case-controls, reported that mean total NCAFS scores differentiated the control dyads ($M = 63.3$, $SD = 8.4$) from the high-risk dyads ($M = 57.8$, $SD = 10.7$) ($t(37) = 2.96$, $p < .01$). Farel et al. reported that high-risk dyads were 6.5 times more likely to receive a score lower than the threshold on the NCAFS than their matched control dyads.

Clinical intervention validity for the NCAFS has been established with several studies. These include studies on enhancing parenting in homeless adolescents (Rich, 1990), orienting substance-abusing mothers to use comforting techniques with their infants (Donaldson, 1991, as cited in Sumner & Spietz, 1994a), and a social competence intervention with a high risk group from pregnancy through the child's first year (Barnard et al., 1988). Rich (1991) reported on a study of maternal-infant bonding among 17 homeless, parenting adolescents in a residential treatment program. The program's focus

was on increasing the adolescents' parenting, job, and life skills. Observational data were collected through videotaping a feeding interaction at three times during the infant's first year: T_1 (under 1 month, $n = 16$), T_2 (1-3 months, $n = 12$), and T_3 (4-6 months, $n = 6$). Videotapes were immediately played back for the mother and she was given feedback and suggestions for behavior modifications where necessary. The tapes for the three time periods were scored using the NCAFS and the scores for the three time periods were pooled. Parent, child, and Total NCAFS scores were obtained and compared to normative data from the NCAST national sample ($n = 767$). Rich (1991) reported that the parent score for the adolescents in the study ($M = 41.9$, $SD = 3.6$) did not differ significantly from the NCAST national sample ($M = 41.6$, $SD = 5.8$). The total child scores did differ significantly between infants in the study ($M = 18.1$, $SD = 3.04$) and children in the NCAST sample ($M = 20.2$, $SD = 3.6$) ($p < .01$). Rich (1991) explained this difference by noting that the infants in the study were younger than the control sample and thus less likely to exhibit many of the behaviors that are assessed via the NCAFS compared to older children. She also noted that on several occasions the infant in the study had been fed a little within an hour prior to the videotaping of the feeding. The total NCAFS scores were also significantly different between the study dyads ($M = 60.0$, $SD = 4.72$) and the control sample ($M = 61.8$, $SD = 6.83$) ($p < .05$). Rich (1991) explained this as a by-product of the difference in the child scores.

Donaldson's study (as cited in Sumner & Spietz, 1994a) dealt with the influences of teaching comforting techniques to mothers who were using cocaine prenatally. The majority of the 15 mothers were African-American, 13 were single, their average age was 26.4 years, and their average educational level was 10.9 years. The infant observed in the

study was typically the mother's third child. Dyads were observed in a feeding interaction in the hospital shortly after birth and then the mothers were offered the opportunity to watch a comforting techniques video. After a minimum of 24 hours post-intervention the dyads were observed during another feeding interaction and scored using NCAFS. Pre- and post-intervention scores were compared with 11 of the mothers improving, two demonstrating decreases, and two showing no change. Sumner and Spietz (1994a) note that, although there was significant improvement in the Social-Emotional Growth Fostering and Responsiveness to Parent subscales of the NCAFS for this sample, a lack of specificity about when pre-intervention scores were collected undercuts the confidence one can have in the effectiveness of the intervention.

Barnard et al. (1988) reported on testing of two interventions directed at influencing mothers' parenting abilities through improving their social competency. A public health nurse offered women inclusion in the study if they were found to be lacking in adequate social support. The two tested interventions were the standard public health model and what Barnard and her colleagues called the Mental Health Model, which focused on the nurse fostering participant relationships and social competencies in addition to providing pregnancy and parenting materials as needed. Overall, the Mental Health Model was found to be more beneficial for mother-infant dyads over the 18 months of the intervention trial. The authors created three groups based on change (or lack thereof) in social competency: Group 1 ($n = 38$) demonstrated high competency initially and it remained high after intervention, Group 2 ($n = 22$) demonstrated low competency initially and it changed to high after intervention, and Group 3 ($n = 23$) demonstrated low competency initially and demonstrated no change after intervention.

Group 2 women demonstrated higher mother total scores on the NCAFS ($M = 35.36$) than Group 3 mothers ($M = 31.60$), though lower than Group 1 mothers ($M = 37.41$).

The strengths and limitations of the NCAFS can be assessed in light of the following dimensions of relationship as discussed by Hinde (1976): (i) content of the component interactions; (ii) diversity of interactions; (iii) reciprocity vs. complementarity: control and power; (iv) qualities of component interactions; (v) relative frequency and patterning of interactions; (vi) multidimensional qualities; and (vii) cognitive and moral levels: levels of perspective. Each of these dimensions is considered in turn.

Hinde (1976) discussed content of component interactions as having applications across multiple levels of analysis, from the microlevel (behavior type) to the macrolevel (relationship differentiation). He suggested that attention to content can allow for classification of relationships based on types of interactions. For example, interactions between mother and child may contain a universe of interactions that overlap partially, but one would not expect they completely overlap with the type of interactions between mates. Thus, relationships between mates and caregiver/child could be differentiated by the content of their various interactions. According to Hinde, attention to the content of interactions can differentiate not only types of relationships, but also the quality within a particular relationship. This can be assessed through either presence or prevalence of particular kinds of interactions (Hinde, 1976)

In the case of the NCAFS, the type of relationship to be assessed, caregiver-child, is determined prior to use of the measure. Its 76 items represent the universe of behaviors of interest in the feeding interaction. It also provides a list of 22 observable child

disengagement cues that a rater is to determine as present or absent during the feeding. It is the quality of the feeding interaction within the caregiver-child relationship that the NCAFS seeks to assess. Given that the NCAFS is a binary scale, with choices of 'yes' or 'no,' the scale measures the quality of the feeding interaction through the combined presence or absence of the 76 observable behaviors.

In regard to diversity of interactions, relationships involving only one type of interaction can be called uniplex, whereas a multiplex relationship is marked by multiple interactions (Hinde, 1976). A relationship can in fact be described as both uniplex and multiplex depending on the level of analysis. For example, the mother-infant relationships could be described as uniplex since it involves only maternal-child interactions rather than interactions one might see between the mother and her sexual partner. However, on another level, the mother-infant relationship could be described as multiplex, involving multiple types of interaction, such as feeding, bathing, playing, teaching, and others (Hinde, 1976). According to Hinde, diversity of interactions is particularly important because one type of interaction may affect others proximally or perhaps more distantly. This means that one type of interaction creates expectation for subsequent interactions through experience, conditioning, benefits, and costs (Hinde, 1976). Thus, one relationship may be constituted by one interactional context whereas another may be constituted by interactions in a variety of contexts. At the same time, there may be a similar set of expectancies that accrue across interactions.

Whether the 76 behaviors of the NCAFS encapsulate the diversity of behaviors during feeding is open to debate. However, these 76 items have been determined through rigorous testing in both research and clinical arenas to be the most salient (in its current

form) in making judgments about the quality of interaction in the feeding context. Yet, questions remain. Does the NCAFS capture the full diversity of behaviors in caregiver-child interaction in the feeding context? To what extent does the feeding interaction reflect the caregiver-child relationship? Theoretically, given the relatively limited number and specificity of behaviors, it cannot capture or reflect all of the interactions in the relationship, but it may not need to do so. It does arguably capture the diversity of behaviors across interactions considered important theoretically and/or clinically in the caregiver-child relationship.

Hinde (1976) described reciprocal interactions as consisting of either simultaneous or alternate displays of similar behaviors. Complementary interactions consist of partner behaviors that differ but balance one another (Hinde, 1976). Hinde (1976) asserts that many of the interactions between young infants and mothers are complementary. However, one might expect that, as the infant develops, a larger proportion of maternal-child interactions will become reciprocal. For example, in play one would not expect a young infant (i.e., 3 months) to initiate play with the caregiver, although they may behave in ways after caregiver initiation of play that are complementary and maintain the playful interaction. As the child becomes older and more cognitively, physically, and socially adept, one would expect to see greater initiation for play on the part of the child and increasing reciprocity in behaviors between the two participants, such as rolling a ball back and forth to one another. One would also expect to see growing reciprocity as children become more autonomous in feeding and the child and caregiver eat together rather than the caregiver feeding the child. The latter is complementary whereas the former is reciprocal.

Hinde (1976) addressed two aspects of complementary interactions: control and power. He reviewed the complexity of studying which partner in the interaction has control over the other. He argued that, in order to understand the dynamics of the relationship, one must be more precise than simply asking who has control in the relationship and instead analyze control at the interaction level rather than the broader relationship level. Accordingly, control rests in a given interaction and that interaction may or may not reflect the relationship. Further, various forms of power between mother-child partners wax and wane over the course of the child's development within the environmental/cultural context in which the dyad interacts (Hinde, 1976). For example, in feeding interactions, the young infant is relatively dependent upon the caregiver to provide nutritional sustenance because the infant has not yet developed the ability to acquire food and feed himself. Thus, the caregiver at this stage of development has tremendous power over the infant through the ability and willingness to meet the infant's basic needs. However, the infant also has power in the interaction through crying and exhibiting agitation that, when extinguished through having feeding (and social) needs met, rewards the parent. Over time, as the child develops increased mobility, fine and gross motor skills that support self-feeding, knowledge about where food is and the ability to access it, the child's dependence upon the parent for feeding diminishes and the power dynamic changes.

The NCAFS appears designed to assess complementary dyadic interactions, particularly through behaviors that constitute caregiver subscales of 'sensitivity to cues' and 'response to child distress' and child subscales of 'clarity of cues' and 'responsiveness to caregiver.' This makes sense given that the NCAFS assesses dyadic

behavior with infants up to 12 months of age when interactions are thought to be 'driven' by the mother/caregiver. Behaviors that demonstrate complementary interaction include, for example, "caregiver slows the pace of feeding or pauses when child shows subtle disengagement cues" and "child looks in the direction of the caregiver's face after caregiver has attempted to alert the child verbally or non-verbally during feeding" (Sumner & Spietz, 1994a). Issues of control and power in the feeding interaction are manifested in the behaviors that reflect contingency and these specific behaviors are clearly demarcated in the NCAFS to allow the calculation of caregiver, infant, and total contingency scores. Of importance is the NCAFS' ability to assess the quality and/or degree of complementarity of interactions over time and to reflect change over time between dyadic partners.

The qualities of component interactions refers to how participants interact with one another (Hinde, 1976). How well the goals of one partner synchronize with the ongoing goals of the other, a phenomenon Hinde calls "meshing," is especially important. Quality can also be thought of in terms of sensitivity and responsiveness of the partners to one another. Furthermore, how the requests, demands, and responses to one another are enacted is important in shaping present and future interactions within the relationship.

Assessment of the quality of the feeding interaction, a component interaction of the mother-child relationship, is a goal of the NCAFS. Several of the behavior items reflect the necessary dimensions of sensitivity and responsiveness, that are explicit in assessing the how of interactions, such as "caregiver makes soothing non-verbal efforts" and "child smiles at caregiver during feeding" (Sumner & Spietz, 1994a). Calculations

of the presence of such behaviors create scores that reflect interactional quality of the caregiver, child, and dyad.

According to Hinde (1976), some of our judgments about the quality of relationships depend upon the patterning of interactions, including relative and absolute frequency and interrelatedness. The important aspects of interactions emerge in relation to one another. Therefore, the relative frequency of partners' behaviors in relation to each other creates the patterned interaction.

The NCAFS uses a binary yes/no format in relation to the presence or absence of a behavior which limits attention to the issues of frequency and, to an even lesser extent, patterning. However, raters must pay attention to the frequency and timing of behaviors in relation to one another in order to accurately determine presence or absence of a specific behavior. For example, in the caregiver 'response to distress' subscale the item "caregiver avoids slapping, hitting, or spanking the child" is scored 'no' only if the behavior occurs within 5 to 10 seconds of the child's signal of distress (Sumner & Spietz, 1994a). Whereas this demonstrates the importance of timing of behaviors, other items require attention to frequency, such as "child has less than three rapid state changes during feeding" (Sumner & Spietz, 1994a).

A limitation of the NCAFS overall, however, is in regard to the property of relative and absolute frequency. Many behaviors need occur only once to force a rater to score one way or another. The significance of multiple occurrences of a particular behavior is thus lost when using the NCAFS. This seems somewhat problematic in light of the loss of potentially relevant information about the patterning of behaviors within the interaction.

Hinde (1976) acknowledges that the quality of a relationship, such as 'warmth,' cannot be determined by a single measure of interaction, but instead consists of several interrelated interactions. In this way, a quality such as 'warmth' or 'sensitivity' is not viewed as unidimensional, but multidimensional and often related to behaviors of the other interactive partner(s). When Hinde discusses the complexity of labeling the quality of a relationship, one must be mindful that he is referring to the quality of a *relationship*, not an interaction. A relationship is defined as a series of interactions over time that sequentially affect the course of the relationship (Hinde, 1976). In the mother-child relationship, for example, interactions may include feeding, bathing, play, comforting; this reflects the multidimensionality to which Hinde refers. For example, one would likely not consider a relationship warm in which there was meshing in feeding, but insensitivity between partners in bathing, play, and comforting. If one uses interaction as the level of analysis, rather than the relationship, it would follow that multidimensionality in interaction would be reflected in the multiple behaviors partners utilize within the interactive context.

The NCAFS explicitly addresses the multidimensional qualities of relating through its multi-item subscales. These subscales can then be scored and combined to create maternal, child, and dyad total scores that speak more broadly to the quality of interaction within the feeding context. One can argue that caregiver sensitivity to cues, response to child's distress, social-emotional and cognitive growth fostering, and child clarity of cues and responsiveness reflect multidimensional qualities that exist across interactions, whether these be feeding, bathing, play, comforting, teaching, or some other. In fact, in regard to teaching, this is exactly what is asserted in the NCAST

Caregiver/Parent-Child Interaction Teaching Manual (Sumner & Spietz, 1994b). A strength of the subscales is their basis in both theory and clinical evidence.

Hinde (1976) embarks upon a relatively complex discussion about the importance of the interrelations between absolute and relative moral and cognitive levels of the relationship participants. It is the initial discrepancy between these levels in the mother and child that shape their interactions (Hinde, 1976). Mother-child interactions over time subsequently contribute to the reduction in the discrepancy as the child develops and typically becomes a functional adult. Different perspectives held by each partner on the self in relationship and on the partner's perceptions of self and other in the relationship are thought to shape the dyad's ability to interact in more or less "meshed" ways (Hinde, 1976). This may occur in spite of, or perhaps due to, instances when perceptions of one another are inaccurate, such as when a mother attributes a higher level of cognitive and moral functioning to her child than the child has actually attained (Hinde, 1976).

The NCAFS does not explicitly measure cognitive and moral levels in interactions between caregiver/mother-child. The NCAFS does acknowledge the discrepancy between caregiver and child and the caregiver's responsibility to the child through the two caregiver subscales of 'social-emotional growth fostering' and 'cognitive growth fostering. The NCAFS indirectly assesses interpersonal perceptions of dyad partners through assessment of how well interactions are "meshed." It accomplishes this through caregiver-child total scores generally, but perhaps more specifically through the scoring of contingency items for the dyad.

The Snack Scale

The Snack Scale (Houck & Spegman, 1999) was used in the proposed study as a means of validating extension of the NCAFS to 24 and 36 months. (See Manual in Appendix B). The Snack Scale was developed to assess mother-child interaction during a meal through a coding system that classifies mothers on the basis of the dimensions of sensitive-responsiveness and control and classifies children on the dimensions of engagement and autonomy. The coding scheme was created for the first 3 minutes of the videotaped feeding interaction. This decision was based on the premise that early interaction presents a challenge for the dyad to negotiate control-autonomy balance and engagement as they establish the rhythm of feeding (G. Houck, personal communication, March 7, 2004). Behavioral classification assignment begins with frequency counts of verbal and nonverbal behaviors. Behavior codes include *mother direct*, m*other follow*, *child autonomy,* and *child follow*. *Mother direct* entails verbal and nonverbal maternal behaviors directed toward change or maintenance of topics in response to child autonomy. These behaviors can be characterized as facilitating child autonomy or controlling child behavior. *Mother follow* represents verbal or nonverbal behaviors that are contingently responsive to the child's overtures, cues, or bids for attention. *Child autonomy* behaviors are self-assertions by the child during the interaction. *Child follow* behaviors follow or adopt maternal activities, directions, or topics. The frequencies were converted to proportions by calculating maternal directs relative to all of her behavior, maternal follow to child autonomy, child autonomy relative to all of child's behavior, and child follow to maternal directs. The proportions were used to help assign classifications to mother and child.

Maternal classifications include *facilitative engaged, controlling engaged, facilitative disengaged, and controlling disengaged. Facilitative engaged* mothers have nearly equal portions of directs and follows, with directs typically facilitating the child and follows typically assisting the child in gaining self-understanding. *Controlling engaged* mothers are distinguished by perceptual awareness and responsiveness to the child that is insensitive to the child's disengagement cues and interactive pacing essential to support of the child's self-expression. The focus appears to be on maintaining the maternal agenda. *Facilitative disengaged* mothers are not behavior controlling but appear to be disconnected from their child's agenda. Maternal responses are primarily to overt cues, bids, or signals and the behavior pattern is remarkable for its sense of a lack of genuine maternal interest or enjoyment. *Controlling disengaged* maternal behavior is marked by a higher proportion of directs than follows and the directive behavior is typically controlling with little to no attention to the child's agenda or needs.

Child classifications include *engaged assertive, intermittent engaged, compliant disengaged, and active disengaged. Engaged assertive* child behaviors are marked by a balance of autonomy and follows that occur in a context of ongoing connectedness between mother and child. The *intermittent engaged* child behavior pattern is notable for intermittent bouts of child verbal engagement with the mother despite ongoing awareness and responsiveness to the mother. *Compliant disengaged* children display little self-assertion or autonomy behaviors directed toward their mothers. They generally appear passive and compliant with a sense of disconnectedness. The *active disengaged* child displays autonomy behaviors that represent self-occupation, with limited orientation, awareness, and responsiveness to the mother except in requesting or demanding food.

The Snack Scale also contains a mutuality rating (1 = poor, 2 = some, 3 = connected) that provides a global assessment of the overall sense of social connection, cooperation, and negotiation. *Poor* mutuality is defined as the dyad demonstrating little awareness of the partner's agenda, with minimal negotiation, shared goals or emotional/social connectedness (Houck & Spegman, 1999). *Some* mutuality is defined as a moderate level of cooperation and some negotiation, though there are also occasions in which the partner's agenda is not acknowledged or joint goals are not negotiated. There is an imbalance in responsiveness, with one partner initiating or following the majority of interactions (Houck & Spegman, 1999). *Connected* dyads with dyadic mutuality are defined as predominantly engaged, in which agendas are shared, negotiated and followed. Interactions are balanced with both partners asserting and following (Houck & Spegman, 1999).

Mother and child are also both rated in terms of affect (1 = negative, 2 = neutral, 3 = positive). *Negative* affect is defined as an overall tone that is negative and sober, outweighing any instances of positive affect. Negative affect is as subdued, flat, or sober, with rare animation. Negative affect may also reflect anger, sadness, irritability, resistance and/or negativity toward the partner (Houck & Spegman, 1999). *Neutral* affect is defined as an absence of a clear, overall or dominant polarized affect. Negative and positive qualities are observed in the manifest affect, leaving one uncertain regarding whether the affect is truly positive or truly negative (Houck & Spegman, 1999). *Positive* affect is defined as an overall quality, in which the actor appears comfortable and content, or to be enjoying the interaction, which is reflected in behavior, such as voice tone, facial

expressions, and verbal expressiveness. The episode is pleasant even if there are instances of sternness or instruction (Houck & Spegman, 1999).

Interrater reliability estimates for the Snack Scale classifications were assessed at 12 (n = 30), 24 (n = 20), and 36 (n = 22) months, respectively. The reliability estimate rates ranged from 83% (k = .75) to 86% (k = .80) for maternal classifications; 90%, (k = .86) to 93% (k = .90) for child classifications; and, 75% (k = .60) to 93% (k = .87) for mutuality. Maternal classifications were found to be significantly stable over time: χ^2(df = 9) = 73.76, $p \leq .000$, 12-24 months; $\chi^2(9) = 71.26$, $p \leq .000$, 24-36 months; and, $\chi^2(9) = 73.76$, $p \leq .000$, 12-36 months. Child classifications were also significantly stable over time: $\chi^2(9) = 42.97$, $p \leq .000$, 12-24 months; $\chi^2(9) = 53.16$, $p \leq .000$, 24-36 months; and $\chi^2(9) = 33.06$, $p \leq .000$, 12-36 months. Mutuality was significantly stable over time: χ^2(df = 4) = 47.80, $p \leq .000$, 12-24 months; $\chi^2(4) = 50.46$, $p \leq .000$, 24-36 months; and $\chi^2(4) = 39.10$, $p \leq .000$, 12-36 months. These findings for stability suggest that feeding patterns are indeed relatively stable across toddlerhood, pointing to potential stability for the NCAFS during this age period as well.

Convergent validity was assessed through examination of the Snack Scale in relation to the CABS and the NCATS (Spegman, 2000). The maternal classifications of the Snack Scale and CABS were significantly related at 12, 24, and 36 months: χ^2(df = 9) = 34.56, $p < .000$; $\chi^2(9) = 20.99$, $p < .013$; and $\chi^2(9) = 19.86$, $p < .019$. Mothers who were sensitive nondirective in play were most often facilitative engaged or superficial during snack. Mothers classified as sensitive directive in play tended to be controlling engaged or superficial during snack. Controlling directive mothers were most often controlling

disengaged or superficial during snack. Finally, mothers classified as intrusive during play tended to be controlling (engaged or disengaged) during snack.

Analysis of variance assessed the differences between maternal classifications on the Snack Scale in terms of NCATS scores. NCATS total caregiver scores were differentiated by the Snack Scale maternal classifications at 12 months ($F(3, 122) = 5.57$, $p \leq .001$), 24 months ($F(3, 110) = 6.04$, $p \leq .001$), and 36 months ($F(3, 102) = 4.10$, $p \leq .009$). The pattern of means, for both total caregiver quality and caregiver contingency scores, was identical at the 24- and 36-month observation periods: facilitative engaged > controlling engaged > superficial > controlling disengaged. At 12 months the pattern was as follows: facilitative engaged > controlling engaged > controlling disengaged > superficial.

The child classifications of the Snack Scale and CABS were significantly related only at 36 months ($\chi^2(9) = 21.67$, $p < .010$). Thirty-six month old children who were classified as engaged assertive on the Snack Scale were most likely to engaged nonautonomous in play. Children intermittently engaged during snack were likely to be engaged with their mothers during play, with two-thirds engaged nonautonomous or engaged autonomous. The majority of the remaining third of these intermittently engaged children were avoidant compliant during play with their mothers. Among those children who were disengaged during snack, either compliant or active, were most likely to be classified avoidant compliant or ignoring during play.

Differences between child classifications on the Snack Scale and maternal NCATS scores were assessed with analysis of variance. With caregiver total score on the NCATS as dependent variable and the Snack Scale child classification as the grouping

variable, the NCATS scores differed by Snack Scale child classifications at 12 months ($F(3,122) = 2.51, p = .062$) and at 24 months ($F(3, 110) = 2.92, p = .037$). When NCATS caregiver contingency scores were substituted as the dependent variable, child classifications significantly differed at 36 months ($F(3, 102) = 3.22, p = .026$). The pattern of total maternal quality means was identical at 12 and 24 months: engaged assertive > intermittent engaged > compliant engaged > active disengaged. The mean pattern for maternal contingent responsiveness at 36 months was as follows: engaged assertive > compliant disengaged > intermittent engaged > active disengaged.

The Snack Scale's strengths and limitations can also be assessed in light of Hinde's (1976) aforementioned dimensions of relationship. The Snack Scale was developed to assess patterns of interaction during a snack episode. The type of relationship of interest is the mother-child relationship. Classification for mothers' interactive behavior concerns those indicative of sensitive-responsiveness and control while children's interactive behaviors are classified according to their engagement and autonomy (Houck & Spegman, 1999). Verbal and nonverbal behaviors within codes of mother direct, mother follow, child autonomy, and child follow are counted to arrive at frequencies. These are then converted to proportions which are used to assign maternal classifications and child classifications (Houck & Spegman, 1999).

As noted above, the dyad is also assessed in terms of degree of mutuality. The definitions of degree of mutuality are characteristic of a rating system. Therefore, the precision with which a rater arrives at a rating lacks description in the coding manual. The heart of this criticism lays in the difference between using observations or ratings to assess social patterns, in this case mutuality. Cairns and Green (1979) assert that ratings

are distinguished from observations by the requirement of social judgment on the part of the observer when using ratings rather than recording observed behaviors without judgment about personal disposition of the actor or quality of the relationship. A central assumption is that the rater's concept of which subject behaviors reflect the quality or attribute being assessed is synonymous with that of the investigator and other raters. Another assumption is that the rater will be able to perceive information relevant to the focal quality or attribute within the realm of the subject's everyday behaviors and that the rater will judge the quality or attribute on the same scale as other raters will.

In light of these assumptions, the suggestion of lack of precision, at least relative to the assignment of maternal and child classifications mentioned earlier, lies in the lack of clear lines of demarcation separating, for instance, a mutuality rating of 2 (some) versus 3 (connected). For example, it is somewhat unclear where one decides a dyad moves from a "moderate level of cooperation and some negotiation" (rating 2) to "predominantly engaged" (rating 3). The rater decision is inferred. This relative lack of precision may in fact be a strength through lack of reliance on some predetermined number or percentage of behaviors that may be quite arbitrary and may not adequately capture the quality of mutuality that is unique within the feeding interaction of a specific dyad. As Cairns and Green (1979) note, the power of human beings as raters lies in their ability to synthesize and abstract from multiple sources of information during observations, which allows attention to the "enduring" properties of the subject(s) of the observation.

Mother and child are also assigned a broad description of affect. The determination of affect is purposefully roughly defined (G. Houck, personal

communication, March 7, 2004). Questions for consideration include what is the cutoff point for 'overall' tone or does one need to be explicitly defined? However, as noted above, one of the basic premises of rating systems is that such definition is unnecessary because human observers carry the same internal calibration of social behaviors such as those reflecting affect.

In this scale, specific behaviors are not explicitly coded at a microlevel like those of the NCAFS, but definitions of the behaviors and classifications appear adequate at a molar level to determine ratings. It would appear that where there are questions about the ratings of mutuality or affect, the research team could make systematic decisions. In regard to Hinde's (1976) discussion of content of interactions, this scale allows for not only determination of presence or absence, but also prominence or prevalence through the use of behavior frequencies, proportions, and qualitative definitions.

The Snack Scale prescribes which behaviors to assess in relation to control-autonomy balance so it would appear to allow for a fuller picture of the diversity of interactions in feeding compared to the NCAFS. It is limited, however, to the first 3 minutes of the feeding so it does not capture the diversity of behaviors throughout the duration of a feeding. For example, it would not be expected to include behaviors involved in termination of a feeding. One must be mindful that the goal of the Snack Scale is to assess control-autonomy balance and engagement as the rhythm of feeding is first being negotiated in the snack interaction. Thus, the Snack Scale may reflect more diversity across interactions, within its short time frame, than does the NCAFS even without assessing the diversity of behaviors throughout the entire feeding.

In regard to issues of reciprocity vs. complementarity, while the Snack Scale does not preclude the assessment of reciprocal interactions, its focus appears to be complementary interactions. The Snack Scale is explicit in its attention to issues of control-autonomy balance between mother and child. The scale allows for the calculation of proportions of child and maternal behaviors in regard to autonomy, control, and engagement. The dynamic nature of the overall feeding interaction can then be assessed through the use of the classifications. In contrast to the NCAFS behavior checklist, its explicit attention to frequencies and proportions makes it better suited to identifying which partner is exerting more control or power in the feeding context.

The Snack Scale is also designed for attention to the quality of the feeding interaction. The mutuality rating is specifically designed to capture the "meshing" of the mother-child pair as reflected in its definition: "how well each partner in the interaction responds to the other's behavioral cues in an adaptive, synchronous, and reciprocal manner" (Houck & Spegman, 1999). The affect rating is used to determine the overall tone of maternal and child feelings toward one another in the snack context, another assessment of quality. However, the scale appears primarily concerned with the classification of interactions according to type rather than quality per se, although quality is inherent in the definitions of the classifications. The mutuality and affect ratings refer to the overall snack interaction rather than the quality of specific behaviors of each partner to one another, on which the ratings are based. Thus, the Snack Scale assesses the quality of component interactions through rating the gestalt of the interaction and as embedded in the classifications, whereas the NCAFS derives a quality score from the presence of "quality" behaviors.

Both relative and absolute frequencies of behaviors are attended to in the coding of the feeding interaction and used to differentially classify the pattern of interaction. In this aspect of describing relationships, the Snack Scale design appears superior to the NCAFS. The Snack Scale only addresses the first 3 minutes of the snack interaction. This time limitation potentially weakens the scale's ability to address quality throughout the interaction, from initiation to termination, in light of patterns and frequencies. However, as noted earlier, the first 3 minutes are thought to present the challenge for the dyad to negotiate the control-autonomy balance and engagement, and thereby reflect a meaningful quality indicator of a complimentary interaction (G. Houck, personal communication, March 7, 2004).

The Snack Scale explicitly addresses the multidimensional qualities that exist across interaction through the interactional dimensions of child autonomy and engagement and maternal control and engagement. The coding manual provides specific definitions of multiple behaviors that constitute each of these dimensions. Behaviors on these dimensions are then used to more broadly classify maternal and child interactive quality and style.

The Snack Scale, as the NCAFS, indirectly assesses interpersonal perceptions of dyad partners through the assessment of "meshing." The Snack Scale appears to assess interpersonal perceptions of dyad partners and "meshing" through the child and maternal classifications and the mutuality ratings. Engagement of the child and mother, respectively, reflects their perceptual awareness and responsiveness to one another (Houck & Spegman, 1999). For the mother, this includes awareness and responsiveness to the child's development, both current and anticipated (Houck & Spegman, 1999)

Self-Report Measures

The Parental Bonding Instrument

In the larger longitudinal study, the Parental Bonding Instrument (PBI) (Parker et al., 1979) was used to evaluate maternal experience with their own parents. The PBI was developed in light of the expectation that social experiences in childhood, particularly those provided by the parent-child relationship, contribute to adult mental health (Parker et al., 1979). One could reasonably expect that these social experiences affect relationships that the now grown child inhabits, including the grown child's relationship with their own children. Thus, the way a child was parented will affect their own parenting and their prior attachment relationship with their parents will impact the type of attachment they have with their own children.

The PBI consists of two subscales reflecting two dimensions of parenting behavior: care and overprotection. These two parental behavior dimensions are seen as bipolar. The Care subscale consists of 12 items that assess the degree of warmth, affection, and acceptance versus coldness, indifference, or rejection. The Overprotection subscale consists of 13 items that assess cooperation with, accessibility to, and the encouragement of autonomy and independence versus strictness, punitiveness, interference, and overprotection. The items describe various types of parental action and behavior. A four point Likert-type scale allows parental responses to the behavioral items from *very like* to *very unlike* their own parents' behaviors. Subjects are asked to recall their first 16 years of life and to rate their own mother and father separately on each item. Negative items were reverse coded so that higher scores reflected more optimal parenting

and the maternal and paternal scores were summed to achieve a total score (Lecuyer-Maus & Houck, 2002).

Cronbach's alpha internal consistency coefficients for the sample in the proposed study were $\alpha = 0.94$-0.95 for the Care subscale and $\alpha = 0.82$-0.89 for the Overprotection subscale (Lecuyer-Maus & Houck, 2002). In particular, at 24 months ($N = 117$), $\alpha = 0.95$ for the Care subscale, $\alpha = 0.89$ for the Overprotection subscale, and $\alpha = 0.93$ for the total scale. Stability coefficients for the total scale were $r = 0.85$ (12-24 months), $r = 0.84$ (24-36 months), and $r = 0.74$ (12-36 months). Given the relative stability of this maternal trait over the course of the study, the study used the data from the 24-month observation period ($N = 117$). The 24-month observation and assessment period contains the highest number of respondents on the PBI among the three time periods of observation. The PBI's validity has been reported elsewhere (Lecuyer-Maus & Houck, 2002). Most relevant to the study are findings of a trend toward respondents ($N = 27$) experiencing current conflicts with their children as seeing their own parents as less caring and more overprotective (Mackinnon, Henderson, Scott, & Duncan-Jones, 1989).

The Concepts of Development Scale

The Concepts of Development (COD) scale (Sameroff & Feil, 1985) was used in the larger, longitudinal study to assess parental beliefs regarding child development. The CODQ is a 20-item Likert-type scale that consists of two views of how children develop: a categorical approach and a compensatory/perspectivistic approach. There are four possible responses: strongly agree, agree, disagree, and strongly disagree. Categorical item responses reflect single explanations for child development that are either constitutional or environmental. For example, "fathers cannot raise their children as well

as mothers" (Sameroff & Feil, 1985). The compensatory/perspectivistic item responses reflect parental thinking of child development as a multicausal, constitution/environment transactional process. For example, "children have to be treated differently as they grow older" (Sameroff & Feil, 1985). The larger longitudinal study used the total score, which reflects the sum of the amount of agreement with the 10 compensatory/perspectivistic items with the amount of disagreement with the 10 categorical items. The scores potentially range from 1 to 4. Higher scores indicate a more multicausal child development perspective. Sameroff and Feil (1985) reported an alpha of .82 for the scale. Alpha coefficients of .72, .64, and .69 at 12, 24, and 36 months, respectively, were reported for the study sample (Lecuyer-Maus & Houck, 2002). In this study no significant differences in CODQ scores over time were found as assessed by repeated measures analysis, F (2, 114) = .039, p = .961. The 12 month CODQ scores were used in subsequent analyses.

The Toddler Temperament Scale

The Toddler Temperament Scale (TTS) (Fullard et al., 1979) was used to assess child temperament at 12, 24, and 36 months. The TTS uses a 97-item assessment of nine dimensions of behavior considered salient to individual differences in functional ability in a given environment at a particular age-appropriate developmental level (Houck, 1999). The mother rates her child's behavior on a 6-point scale (1:almost never to 6:almost always) for behavioral areas including responses to people and environments, sleep, feeding, diapering, dressing, and bathing. A difficulty score can be calculated using subscales of activity, adaptability, approachability, mood, and intensity (Houck, 1999).

Fullard et al. (1979) reported test-retest reliability correlations ranging from r = 0.69 to 0.89 for the nine subscales, with only 'distractability' falling below 0.70 over an elapsed time period of one year. Fullard et al. reported convergent construct validity through correlations between the various subscales and maternal general perceptions of temperament (r = 0.09-0.55, all significant at least $p < 0.05$ except 'threshold'). Convergent validity has also been reported between the TTS and the Preliminary Toddler Behavior Assessment (1988) on Activity Level (AL) (r = 0.73 [maternal data]) and Approach-Sociability (AS) (r = 0.79 [maternal data]) and between the TTS and the EASI-III (1975) on AL (r = 0.56 [maternal data]), Negative Emotionality (NE) (r = 0.52 [maternal data]), and AS (r = 0.46 [maternal data]) (p values were not reported for any of these data) (Goldsmith, Briggs, & Rieser-Danner, 1991).

Houck (1999) reported discriminant validity of the TTS in relation to the Infant/Child Monitoring Questionnaire, which measures child developmental competence. She noted that there was only one small significant correlation between the two measures at 36 months (r = -0.21, $p < 0.01$); otherwise, there were no significant correlations between the two scales at 8, 12, or 24 months. Goldsmith et al., on the other hand, reported that the discriminant validity of the TTS was relatively poor in a comparison between eight temperament scales, possibly due to the higher number of subscales and/or because the subscales were not created through factor analysis or other statistical techniques (p. 575).

Wyman et al. (1999) reported predictive validity of the TTS in which children with easier temperaments in preschool were more likely to be resilient at ages seven to nine years (F = 11.12, $p < 0.001$). Houck (1999) also reported an increasingly significant

negative correlation between difficult temperament and social competence when measured at 8, 12, 24, and 36 months (r = - 0.52, p = 0.001, at 36 months).

Fullard, Carey, and McDevitt's (1984) TTS initially appears to have adequate reliability on the whole, with all its test-retest correlations greater than 0.70 except one, and its overall internal consistency Cronbach's alpha of 0.85. Houck (1999) reported adequate Cronbach's alpha internal consistency reliability estimates for the TTQ in the larger, longitudinal study as α= 0.77 at 12 months, α= 0.77 at 24 months, and α= 0.85 at 36 months. Of the subsequently reviewed studies that used the TTS, only Houck (1999) reported a total TTS internal consistency Cronbach's alpha greater than 0.70. TTQ stability coefficients (r's) were 0.61 (12-24 months), 0.65 (24-36 months), and 0.40 (12-36 months) for the sample. Again, the reported test-retest reliabilities, while significant, are less than 0.70 (Houck, 1999).Given the relative stability of the TTQ over each time period, data from the 12-month group was used in the study.

In the original study and following cited studies using the TTS above, the TTS has at times demonstrated some criterion and construct validity. The studies used in this review of the TTS certainly raise some concerns about the use of the TTS that will require follow-up, particularly since the TTS was used in the primary study upon which this study was based.

Procedures for Coding

All 116 videotaped observations were used for 12, 24, and 36 months. The researcher was trained to accuracy on the NCAFS coding by a certified NCAST instructor. An NCAST instructor was hired to establish interrater reliability. For each age period, the researcher and the consultant individually coded 58 tapes and cross-coded 9

tapes. Each tape was assigned an identification number and contained the observations for a single dyad. The 116 tapes were split into two groups according to numeric descending order. At 12 months, the researcher coded the first 58 tapes and the consultant coded the remaining 58 tapes. This was reversed at 24 months, with the consultant coding the first 58 tapes. Order was reversed again at 36 months, with the researcher coding the first 58 tapes. After an initial 19 tapes were coded the researcher and consultant drew random numbers to determine which three tapes of the initial 19 would be cross-coded to assess interrater reliability. This procedure was repeated after the next 19 tapes and after the final 20 tapes for each observation period. Meetings were held after each cross-coding (nine occasions) to determine percentage agreement and to discuss items about which disagreement occurred until consensus was reached regarding an item's score. The consensus coded sheet was entered into the database for analysis along with the individually coded dyads. K. E. Barnard (personal communication, June 7, 2002) noted that all NCAFS items would likely be appropriate to include in analysis, with the exception of Sensitivity to Cues items 1, 2, 3, Social-Emotional Growth Fostering item 29, and Clarity of Cues item 65, which may be questionable at the older ages.
The decision was made to code each dyad at each observation period with all the original NCAFS items included to assess which items may be questionable at the older child ages.

Interrater Agreement and Reliability for NCAFS at 12, 24, and 36 months

Interrater reliability was assessed through percent agreement, Cohen's kappa, and interrater correlations. Average percent agreement for each observation period was greater than ninety percent (Table 4). Interrater reliability assessment via Cohen's kappa was performed at the NCAFS subscale level (Table 5).

Table 4

NCAFS Interrater Reliability Percent Agreement

Observation Period	*n*	range (%)	average (%)
12 months	18	82.9-97.4	90.86
24 months	18	82.9-96.1	91.16
36 months	18	90.8-100	94.57

Note. Overall average agreement = 92.2%

Table 5

NCAFS Interrater Reliability Assessed via Cohen's Kappa

	12mos	24mos	36mos
Subscale	k (n = 18)	k (n = 18)	k (n = 18)
I. Sensitivity to Cues	.80	.75	.79
II. Response to Child's Distress	.73	.79	.88
III. Social-Emotional Growth-Fostering	.65	.68	.83
IV. Cognitive Growth Fostering	.53	.85	1
V. Clarity of Cues	.62	.66	.79
VI. Responsiveness to Caregiver	.80	.75	.94

Note. Median overall NCAFS kappa: k (12 months) = .69; k (24 months) = .75; k (36 months) = .86.

Correlational analysis of interrater NCAFS total scores was performed. The total scores at 12, 24, and 36 months were significantly positively correlated, $r = .64$ ($p < .01$),

$r = .61$ ($p < .01$), and $r = .75$ ($p < .001$), respectively. Paired sample t-tests were performed to assess for significant differences between researcher and consultant total scores at each observation period, as well. There were no significant differences at any time period: a) 12 months ($t(17) = 1.20, p > .05$), b) 24 months ($t(17) = .28, p > .05$), and c) 36 months ($t(17) = .62, p > .05$).

Data Analysis

Aim 1: Assess the reliability and validity of NCAFS assessment at 24 and 36 months. Internal consistency at each age was assessed using Cronbach's alphas to be consistent with previous NCAST psychometric studies. Pearson's *R* correlations were used to assess stability/test-retest of chosen NCAFS subscale scores (caregiver total, child total, and dyad total). Interrater reliability was assessed through percent agreement, Cohen's kappa, and Pearson's *R* correlations. Validity was assessed via MANOVA between the Snack Scale ratings and NCAFS subscale scores for caregiver, child, and dyad. Snack Scale ratings served as the grouping variables and NCAFS subscale scores were the multivariables. Further validity was assessed via ANOVA between the Snack Scale ratings and NCAFS total scores (caregiver, child, and dyad total). Snack Scale ratings served as the grouping variable.

Aim 2: Assess how maternal characteristics (maternal relationship history of care and overprotection/control with their own parents and maternal beliefs related to child development) and a child characteristic (temperament) contribute to variations in feeding interactions.

Multiple regression was used in this assessment between outcomes on the three maternal report instruments and dyadic total, caregiver, and child scores on the NCAFS at each

age. The outcomes on the three maternal report instruments served as predictor variables and the NCAFS scores served as dependent variables.

CHAPTER IV

RESULTS

Nursing Child Assessment of Feeding

The first aim of this study was to assess the reliability and validity of NCAFS assessment at 24 and 36 months. Table 6 provides the means and standard deviations for the individual subscales, caregiver, child, and caregiver-child total scores at 12, 24, and 36 months. In addition, the same data are reported for the NCAFS normative sample at 12 months (Sumner & Spietz, 1994a). Since there are no normative data at 24 and 36 months, 12-month normative statistics were used in comparisons at each time point. Z scores were calculated to assess similarity between the study sample and the normative sample on caregiver, child, and caregiver-child total scores (Table 7). At each age, the study sample mean scores were significantly different from those of the normative sample, with the study sample having lower mean scores. Equality of variance was also tested via Chi-Square between the study sample and the normative sample at each time period (Table 8). At each age, the study sample was found to have a significantly restricted variance compared to the normative sample for caregiver, child, and caregiver-child total scores. Potential reasons for this will be discussed later.

The restriction in variance suggested that this study's sample was likely more homogenous than that of the normative sample. In order to further explore similarities and differences between the two samples, analyses of mean score differences for specific subgroups of subjects were performed at 12 months (see Tables 9 and 10). Caucasian dyads in which mothers were classified as adolescents, low education adults, or high education adults did not significantly differ from similarly classified normative sample

dyads in regard to caregiver, child, and caregiver-child total scores. African-American dyads classified according to the same education categories also did not significantly differ from similarly classified normative sample dyads in regard to caregiver, child, and caregiver-child total scores except for caregiver-child total scores among high education adults ($z = -2.01$, $p < .05$). Thus, at the subgroup level, the study's sample and the normative sample appear to be more similar.

Table 6

NCAFS: Descriptive Data at 12, 24, and 36 months (N = 116)

Scale or Subscale	Possible Range	12 mos Actual Range	12 mos *M*	12 mos *SD*	24 mos Actual Range	24 mos *M*	24 mos *SD*	36 mos Actual Range	36 mos *M*	36 mos *SD*	Norm* Mean	Norm* *SD*
I. Sensitivity to Cues	0-16	6-15	11.34	1.53	6-14	11.05	1.65	8-15	11.08	1.22	13.81	1.85
II. Response to Child's Distress	0-11	5-11	8.16	1.53	6-11	8.09	.89	6-11	8.22	.97	10.06	1.31
III. Social-Emotional Growth Fostering	0-14	8-14	11.84	1.21	7-14	11.78	1.36	8-14	11.80	1.67	12.25	1.78
IV. Cognitive Growth Fostering	0-9	7-9	8.63	.55	8-9	8.85	.36	7-9	8.91	.39	7.18	1.79
Caregiver Total	0-50	30-47	39.81	3.05	34-45	39.78	2.63	29-46	40.02	2.38	43.30	4.87
VI. Clarity of Cues	0-15	8-15	12.05	1.46	9-15	12.35	1.26	9-15	12.09	1.36	12.93	1.90
VI. Responsiveness to Caregiver	0-11	4-10	6.99	1.12	5-9	7.16	1.11	4-9	7.22	1.01	8.06	1.93
Child Total	0-26	14-24	19.04	2.03	15-23	19.52	1.87	14-23	19.32	1.82	20.99	3.40
Dyad Total	0-76	49-68	58.85	4.02	51-66	59.29	3.56	48-68	59.34	3.16	64.29	7.27

Note. * N = 791, all mothers are adults aged 20-45 years; children 1-12 months of age. Sample is Caucasian, controlling for maternal education and child age.

Table 7

NCAFS Sample and Normative Data Comparison: Z Scores

Score	12 mos	24 mos	36 mos
Caregiver Total			
Sample[a] *M*(*SD*)	39.81(3.05)	39.78(2.63)	40.42(2.38)
Norm[b] *M*(*SD*)	43.30(4.87)	43.30(4.87)	43.30(4.87)
z Score	-7.72	-7.79	-7.26
Child Total			
Sample *M*(*SD*)	19.04(2.03)	19.52(1.87)	19.32(1.82)
*Norm *M*(*SD*)	20.99(3.40)	20.99(3.40)	20.99(3.40)
z Score	-6.17	-4.67	-5.29
Caregiver-Child Total			
Sample *M*(*SD*)	58.85(4.02)	59.29(3.56)	59.34(3.16)
*Norm *M*(*SD*)	64.29(7.27)	64.29(7.27)	64.29(7.27)
z Score	-8.05	-7.40	-7.34

Note. [a] N = 116. [b] N = 791, all mothers are adults aged 20-45 years; children 1-12 months of age. Sample is Caucasian, controlling for maternal education and child age. Mean and *SD* values from normative sample were used consistently for comparison at 12, 24, and 36 months.

Table 8

Test of Equality of Variance between NCAFS Study Sample and Normative Sample

Scale or Subscale	12 mos	24 mos	36 mos
Caregiver Total			
Sample *SD*	3.05	2.63	2.38
Norm *SD*	4.87	4.87	4.87
χ^2 (df = 115)	45.04**	33.65**	27.49**
Child Total			
Sample *SD*	2.03	1.87	1.82
Norm *SD*	3.40	3.40	3.40
χ^2 (df = 115)	40.79**	34.72**	32.83**
Caregiver-Child Total			
Sample *SD*	4.02	3.56	3.16
Norm *SD*	7.27	7.27	7.27
χ^2 (df = 115)	35.16**	27.59**	21.76**

** $p < .01$ (Critical values for χ^2 (df = 100) = 70.07-135.81)

Table 9

12-Month NCAFS Caucasian Sub-sample and Normative Data Comparison: Z Scores

Score	Adolescent ($n = 5$)	Low Ed. Adult ($n = 8$)	High Ed. Adult ($n = 24$)
Caregiver Total			
Sample *M*(*SD*)	39.40(3.13)	40.38(2.56)	39.04(2.88)
Norm[a] *M*(*SD*)	37.76(6.87)	38.40(7.59)	41.18(5.95)
z Score	. 53	.74	-1.77
Child Total			
Sample *M*(*SD*)	19.20(2.59)	19.00(2.07)	18.88(1.57)
Norm[b] *M*(*SD*)	18.95(3.87)	19.82(3.88)	20.20(3.86)
z Score	.14	.32	-1.67
Caregiver-Child Total			
Sample *M*(*SD*)	58.60(5.03)	59.38(4.10)	57.92(3.46)
Norm[c] *M*(*SD*)	56.71(9.46)	58.22(10.12)	61.38(8.74)
z Score	.45	.32	-1.94

Note. [a] $N = 236$, adolescents are 13-18 years old, children are 1-12 months old. [b] $N = 125$, low education adults are 19-25 years old with less than 12 years of education. [c] $N = 430$, high education adults are 19-25 years old with 12 or more years of education. Children are 1-12 months of age for each of the normative groups.

Table 10

12-Month NCAFS African-American Sub-sample and Normative Data Comparison: Z Scores

Score	Adolescent ($n = 1$)	Low Ed. Adult ($n = 2$)	High Ed. Adult ($n = 10$)
Caregiver Total			
Sample *M*(*SD*)	38.00(0.00)	36.00(8.49)	37.70(1.89)
Norm[a] *M*(*SD*)	37.76(6.87)	38.40(7.59)	41.18(5.95)
Z Score	. 03	-.45	-1.85
Child Total			
Sample *M*(*SD*)	19.00(0.00)	18.00(1.41)	18.10(2.23)
Norm[b] *M*(*SD*)	18.95(3.87)	19.82(3.88)	20.20(3.86)
Z Score	.01	-.66	-1.72
Caregiver-Child Total			
Sample *M*(*SD*)	57.00(0.00)	54.00(7.07)	55.80(3.26)
Norm[c] *M*(*SD*)	56.71(9.46)	58.22(10.12)	61.38(8.74)
Z Score	.11	-.59	-2.01

Note. [a] $N = 236$, adolescents are 13-18 years old, children are 1-12 months old. [b] $N = 125$, low education adults are 19-25 years old with less than 12 years of education. [c] $N = 430$, high education adults are 19-25 years old with 12 or more years of education. Children are 1-12 months of age for each of the normative groups.

Selected Demographic Characteristics in Relation to NCAFS

Several demographic characteristics of the sample were associated with NCAFS caregiver, child, and/or caregiver-child scales. Ethnicity was found to significantly differentiate the sample's scores on these scales (Table 11). This was an unexpected

finding given the lack of ethnic differences in the NCAFS normative sample (Sumner & Spietz, 1994a).

Table 11

Ethnic Differences on NCAFS Scales: T-tests

	12 mos		24 mos		36 mos	
Scale	*M* (*SD*)	*t*[a]	*M* (*SD*)	*t*[a]	*M* (*SD*)	*t*[a]
Caregiver						
A-A[b]	38.14 (3.24)	-2.77**	38.76 (2.53)	-2.15*	38.67 (2.82)	-3.06**
Caucasian	40.13 (2.90)		40.11 (2.60)		40.36 (2.15)	
Child						
A-A[b]	18.24 (1.87)	-2.10*	19.29 (2.26)	-.65	18.95 (1.66)	-1.02
Caucasian	19.22 (1.94)		19.58 (1.78)		19.40 (1.83)	
Caregiver-Child						
A-A[b]	56.38 (3.53)	-3.25**	58.05 (3.68)	-1.92*	57.62 (3.29)	-2.95**
Caucasian	59.35 (3.82)		59.69 (3.50)		59.76 (2.92)	

Note. [a]*(df)* = 110. [b]A-A = African-American (n = 21). Caucasian (n = 91). Four "other" ethnicity subjects were excluded from analysis.
* $p < .05$. ** $p < .01$.

No hypotheses about ethnic differences were developed a priori. Further, in addition to unequal sample sizes, ethnicity was confounded with lower income, χ^2 (10) = 18.41, $p <$ .05 (2-sided) and though ethnicity was not significantly confounded by maternal educational level, χ^2 (6) = 3.42, $p > .05$ (2-sided), 75% of African-American mothers had not been educated beyond high school compared to 60% of Caucasian mothers. Thus, further analysis controlling for ethnicity was not performed.

There were no significant differences between male and female children for any of the NCAFS caregiver, child, and/or caregiver-child scales during any of the observation periods. There were significant differences among maternal education levels in relation to a few NCAFS scales when assessed via one way analysis of variance (ANOVA). For the 12-month child total scores, the ANOVA revealed significant differences, $F(3, 107) = 4.04$, $p < .01$. The means and standard deviations for the education levels at 12 months were as follows: College graduate ($M = 20.15$, $SD = 1.84$), some college ($M = 19.41$, $SD = 1.65$), high school graduate ($M = 18.38$, $SD = 2.06$), and did not complete high school ($M = 18.96$, $SD = 2.07$). Post hoc analyses revealed that children of mothers who were college graduates had significantly higher NCAFS child total scores than did children whose mothers were high school graduates. There were no significant differences in any of the other pairwise comparisons.

For the 36-month child total scores, the ANOVA also revealed significant differences by education level, $F(3, 107) = 4.25$, $p < .01$. The means and standard deviations for the education levels at 36 months were as follows: College graduate ($M = 20.45$, $SD = 1.43$), some college ($M = 18.59$, $SD = 1.89$), high school graduate ($M = 19.33$, $SD = 1.84$), and did not complete high school ($M = 19.04$, $SD = 1.72$). Post hoc analyses revealed that children of mothers who were college graduates had significantly higher NCAFS child total scores than did children whose mothers were not high school graduates. This was also the case for children of college graduates in comparison to children of mothers with some college. There were no significant differences in any of the other pairwise comparisons.

For 36-month caregiver-child total scores, the ANOVA uncovered significant differences among education levels, $F(3, 107) = 2.82$, $p < .05$. The means and standard deviations for the education levels at 36 months were as follows: College graduate (M = 61.15, SD = 2.48), some college (M = 58.77, SD = 2.72), high school graduate (M = 59.02, SD = 3.35), and did not complete high school (M = 58.85, SD = 3.50). Post hoc analyses revealed no significant differences among the groups, but trends were noted for dyads in which the mother was a college graduate to have higher scores than dyads with mothers with lower levels of educational completion. No hypotheses regarding education level differences were generated a priori and significant differences were only noted on a few occasions. Therefore, education level was not controlled for in subsequent analyses.

Differences among intake income levels were assessed in relation to 12-, 24-, and 36-month NCAFS scales. There were no significant differences among income levels in relation to caregiver-child, caregiver, and child NCAFS scales when assessed via one way analysis of variance (ANOVA).

Internal Consistency

The internal consistency of the NCAFS individual subscales, as well as the broader dimensions of caregiver, child, and caregiver-child scales were assessed via the Kuder-Richardson formula (K-R 20) for 12-, 24-, and 36-month observations (Table 12). Alpha estimates obtained were well below conventional levels of acceptability and below those reported in the NCAFS manual. Sumner and Spietz (1994a) reported Cronbach's alphas for the NCAFS as follows: Sensitivity to Cues (α = .60), Response to Distress (α = .69), Social-Emotional Growth Fostering (α = .63), Cognitive Growth Fostering (α = .69),

Clarity of Cues (α = .56), Responsiveness to Caregiver (α = .58), Caregiver Total (α = .83), Child Total (α = .73), and Caregiver-child Total (α = .86).

Table 12

Internal Consistency of NCAFS (*N* = 116)

	12mos	24mos	36mos
Subscales	K-R 20 (*)	K-R 20 (*)	K-R 20 (*)
I. Sensitivity to Cues	.36 (11)	.31 (13)	-.02 (13)
II. Response to Child's Distress	.43 (11)	.01 (10)	.41 (8)
III. Social-Emotional Growth Fostering	.31 (10)	.41 (9)	.22 (10)
IV. Cognitive Growth Fostering	.11 (4)	-.06 (3)	.58 (4)
V. Clarity of Cues	.43 (7)	.28 (9)	.37 (9)
VI. Responsiveness to Caregiver	.09 (11)	.15 (8)	.21 (4)
Caregiver	.57 (36)	.44 (35)	.43 (35)
Child	.41 (18)	.37 (17)	.40 (16)
Total	.60 (54)	.52 (52)	.47 (51)

Note. * = number of items remaining in subscale/scale after items with zero variance removed. Total number of items for each subscale/scale can be found in Appendix B.

In this study, several subscales had items drop out of the analysis due to zero variance (Table 13). When individual items were assessed for differentiation of at least 10% of the sample from the other subjects a relatively small but stable set of items emerged (Table 14). At the level of caregiver, child, and total scales, this item mortality generally tended to worsen over time. Given the poor internal consistency obtained initially, a decision was made to assess NCAFS item-total correlations with caregiver, child, and caregiver-child total scores. If an item had a correlation of $r = .10$ or higher at one or more of the time periods, the item was maintained for calculation of new alpha coefficients using K-R 20; see Table 15. For the caregiver scale, 28 of 50 possible items remained. For the child scale, nine of 26 possible items remained. For the caregiver-child scale, a loss of over half the items from the original scale resulted in 37 of 76 possible items remaining. Alpha coefficients improved consistently, and sometimes dramatically, at each time period (Table 15).

Table 13

Internal Consistency: NCAFS Items Removed for Zero Variance

Subscales	12 months	24 months	36 months
I. Sensitivity to Cues	1, 2, 3, 4, 9	3, 4, 9	6, 9, 12
II. Response to Child's Distress	--	27	17, 24, 27
III. Social-Emotional Growth Fostering	28, 30, 31, 35	30, 31, 33, 35, 38	28, 30, 35, 38
IV. Cognitive Growth Fostering	42, 44, 45, 48, 50	42, 43, 44, 45, 48, 49	42, 45, 48, 49, 50
V. Clarity of Cues	54, 55, 56, 57, 59, 60, 62, 65	54, 55, 57, 60, 62, 65	54, 57, 59, 60, 62, 65
VI. Responsiveness to Caregiver	--	68, 69, 70	68, 69, 70, 76

Note. Items 9, 30, 35, 42, 45, 48, 54, 57, 60, 62, and 65 consistently demonstrate zero variance. Item descriptions can be found in Appendix A.

Table 14

Internal Consistency: NCAFS Items with 10% or Greater Variance in Score

Subscales	12 months	24 months	36 months
I. Sensitivity to Cues	5, 7, 8, 10, 11, 14, 15, 16	1, 5, 7, 8, 10 11, 14, 15, 16	1, 5, 7, 8, 11, 14, 15
II. Response to Child's Distress	18, 19, 21, 22, 23	18, 21, 22, 23	21, 22, 23
III. Social-Emotional Growth Fostering	29, 32, 34, 37, 41	29, 32, 34, 37, 39, 40, 41	29, 32, 34, 37, 39, 41
IV. Cognitive Growth Fostering	46	46	--
V. Clarity of Cues	52, 53, 58, 61, 63, 64	52, 53, 58, 61, 63, 64	52, 53, 58, 61, 63, 64
VI. Responsiveness to Caregiver	67, 71, 72, 73, 74	66, 67, 71 72, 73	66, 71, 72, 73

Table 15

Internal Consistency of NCAFS compared to Modified NCAFS ($N = 116$)

	12mos	24mos	36mos
Subscales	K-R 20 (*)	K-R 20 (*)	K-R 20 (*)
Caregiver	.57 (.59)	.44 (.47)	.43 (.56)
Child	.41 (.57)	.37 (.50)	.40 (.50)
Total	.60 (.63)	.52 (.57)	.47 (.57)

Note. * = K-R 20 of Modified NCAFS.

Stability

Stability of the NCAFS was assessed for caregiver, child, and caregiver-child total scores between 12 and 24 months, 24 and 36 months, and 12 and 36 months. Caregiver scores were significantly correlated at each of these measurement periods: $r = .15$, $p = .05$; $r = .25$, $p < .01$; and $r = .30$, $p < .01$, respectively. Child scores were significantly correlated only between 12 and 36 months, $r = .24$, $p < .01$. Caregiver-child total scores were also significantly correlated only between 12 and 36 months, $r = .32$, $p < .01$.

Convergent Validity

Convergent validity was assessed between the Snack Scale classifications and the NCAFS at 12, 24, and 36 months. The two scales were assessed for convergence given their focus on caregiver and child interactive behaviors and the contribution of these interactive behaviors to overall feeding interaction quality. One-way multivariate analysis of variance (MANOVA) was carried out with Snack Scale mutuality classifications serving as the grouping variable and the NCAFS subscales as the multivariables. One-

way analysis of variance (ANOVA) was conducted with Snack Scale mutuality classifications in relation to the caregiver-child total score.

Convergent validity was assessed for maternal measures by MANOVA with Snack Scale maternal classifications as the grouping variable and NCAFS maternal subscales, and ANOVA with Snack Scale maternal classifications and NCAFS caregiver total score. Convergent validity was assessed for child measures by MANOVA using Snack Scale child classifications as the grouping variable and NCAFS child subscales as the mutivariables, and by ANOVA with Snack Scale child classifications in relation to NCAFS child total score. SPSS MANOVA and ANOVA were used for these analyses.

12-Month Dyadic Assessment

MANOVA was performed with 12-month dyadic mutuality ratings serving the grouping variable (poor, marginal, connected) in relation to six dependent variables (NCAFS, 12 months): Sensitivity to Cues, Response to Distress, Social-Emotional Growth Fostering, Cognitive Growth Fostering, Clarity of Cues, and Responsiveness to Caregiver. All 116 dyads were included in the analysis and no transformation of any of the variables was deemed necessary after assessment for violation of assumptions. See Table 16 for mean scores and standard deviations for the NCAFS subscales as a function of the Snack Scale mutuality classifications. See Table 17 for correlations among NCAFS subscales at 12 months.

Table 16

Mean Scores and Standard Deviations for 12-month NCAFS Subscales as a Function of 12-month Snack Scale Mutuality Classifications

	Sensitivity to Cues		Response to Distress		Social-Emotional Growth Fostering		Cognitive Growth Fostering		Clarity of Cues		Responsiveness to Caregiver	
Classification	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Connected	11.74	1.19	8.26	.81	12.63	.68	8.89	.32	12.42	1.17	7.53	1.22
Marginal	11.43	1.52	8.21	1.36	11.94	1.05	8.65	.54	12.03	1.49	7.04	.98
Poor	10.86	1.66	8.00	1.28	11.10	1.45	8.41	.63	11.86	1.57	6.52	1.21

Table 17

Pearson's *R* Correlation Coefficients for Relations Among 12-month NCAFS Subscales

Measure	1	2	3	4	5	6
1. Sensitivity to Cues	--					
2. Response to Distress	.13	--				
3. Social-Emotional Growth Fostering	.21*	.14	--			
4. Cognitive Growth Fostering	.29**	.25**	.37**	--		
5. Clarity of Cues	.21*	.05	.12	.09	--	
6. Responsiveness to Caregiver	.11	-.05	.29**	.11	.22	--

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

The assumption of homogeneity of variance-covariance matrices was violated at 12 months (Box's $M = 75.91$, $F(42, 10038) = 1.61$, $p < .01$), which may have led to a distortion of the estimate of error variance (Tabachnick & Fidell, 2001). In response to this violation, Pillai's criterion was used to evaluate multivariate significance (Olson, 1979). Significant differences were found among the three 12-month mutuality classifications on the dependent measures, Pillai's $V = .23$, $F(12, 218) = 2.34$, $p < .01$; see Table 18.

Table 18

Multivariate and Univariate Analyses of Variance for 12-month NCAFS Subscales

	Multivariate	Univariate					
Source	F^a	Sensitivity to Cues[b]	Response to Distress[b]	Social-Emotional Growth Fostering[b]	Cognitive Growth Fostering[b]	Clarity of Cues[b]	Responsiveness to Caregiver[b]
Mutuality[c]	2.34**	2.22	.34	11.36**	4.73**	.87	5.17**
MSE		2.28	1.60	1.25	.29	2.14	1.18

Note. Multivariate F ratio was generated from Pillai's statistic. [a]Multivariate $df = 12, 218$. [b]Univariate $df = 2, 113$. [c]12-month Snack Scale Mutuality Classification. *MSE* = Mean Squared Error.
** $p \leq .01$

The multivariate η^2 based on Pillai's V was modest at .11, observed power = .96. The pattern of means in Table 16 suggests that connected mothers demonstrated slightly higher levels of Sensitivity to Cues, Response to Distress, Social-Emotional Growth Fostering, and Cognitive Growth Fostering than did marginally connected mothers, who, in turn, demonstrated slightly higher levels of these characteristics than poorly connected mothers. The same pattern was apparent for children in terms of Clarity of Cues and Responsiveness to Caregiver.

ANOVAs were conducted for each of the dependent subscales as follow-up to the MANOVA. Using the Bonferroni method, each ANOVA was tested at the $p = .025$ level. Twelve-month mutuality classifications significantly differed on scores of Social-Emotional Growth Fostering, Cognitive Growth Fostering, and Responsiveness to Caregiver, $\eta^2 = .17$ (observed power = .82), $\eta^2 = .08$ (observed power = .99), and $\eta^2 = .08$ (observed power = .78), respectively. However, Levene's test of equality of error variances revealed significant deviations among classification groups for Social-Emotional Growth Fostering ($F(2, 113) = 4.44$, $p < .05$) and Cognitive Growth Fostering ($F(2, 113) = 14.29$, $p < .001$); these results must be interpreted with some caution.

Post hoc analyses consisted of pairwise comparisons between classification groups to determine which mutuality classifications significantly differentiated the subscale scores. Each pairwise comparison was tested at the $p = .05$ level after Bonferroni correction for multiple comparisons. Those dyads classified as connected had significantly higher scores on maternal Social-Emotional Growth Fostering, maternal Cognitive Growth Fostering, and child Responsiveness to Caregiver than did those dyads classified as poor in mutuality. Dyads classified as marginal in mutuality also scored

significantly higher on maternal Social-Emotional Growth Fostering than did dyads classified as poor in mutuality. There were no significant differences between dyads considered connected versus marginal in mutuality on these subscales.

An ANOVA was also performed to assess differences between 12-month Snack Scale mutuality classifications in relation to NCAFS caregiver-child total scores (See Table 19 for means and standard deviations). The ANOVA revealed significant differences, $F(2, 113) = 9.98$, $p < .001$. Post hoc analyses revealed that dyads classified as connected and those classified as marginal had significantly higher NCAFS caregiver-child total scores than did those dyads classified as poor in mutuality. Those dyads classified as connected and marginal were not significantly different from one another in dyadic quality as measured by NCAFS.

12-Month Maternal Assessment

Using 12-month maternal classifications as the grouping variable (facilitative engaged, controlling engaged, facilitative disengaged, and controlling disengaged) a MANOVA was performed on the four dependent variables (NCAFS, 12 months): Sensitivity to Cues, Response to Distress, Social-Emotional Growth Fostering, and Cognitive Growth Fostering. All 116 dyads were included in the analysis and no transformation of any of the variables was deemed necessary. See Table 20 for mean scores and standard deviations for the NCAFS maternal subscales as a function of the Snack Scale maternal classifications at 12 months.

Table 20

Mean Scores and Standard Deviations for 12-month NCAFS Caregiver Subscales as a Function of 12-month Snack Maternal Classifications (N = 116)

	Sensitivity To Cues		Response to Distress		Social-Emotional Growth Fostering		Cognitive Growth Fostering	
Classification	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Facilitative Engaged	11.81	1.17	8.38	.86	12.67	.66	8.90	.30
Controlling Engaged	11.84	1.37	8.20	1.04	11.96	1.27	8.80	.41
Facilitative Disengaged	11.21	1.49	8.07	1.45	11.74	1.04	8.60	.54
Controlling Disengaged	10.71	1.74	8.11	1.40	11.29	1.41	8.32	.67

Again, the assumption of homogeneity of variance-covariance matrices was violated (Box's $M = 56.32$, $F(30, 23210) = 1.75$, $p < .01$). Pillai's criterion was used to evaluate multivariate significance (Olson, 1979). Significant differences were found among the 12-month maternal classifications on the maternal subscale score, Pillai's $V = .25$, $F(12, 333) = 2.53$, $p < .01$; see Table 21. The multivariate η^2 based on Pillai's V was modest, .08, observed power = .97. The pattern of means revealed that controlling engaged mothers, on average, scored highest on sensitivity to cues, followed by facilitative engaged mothers, facilitative disengaged mothers, and controlling disengaged mothers, in that order. Facilitative engaged mothers, however, scored highest in Social-Emotional Growth Fostering and Cognitive Growth Fostering, followed by controlling engaged mothers, then facilitative disengaged mothers, and finally controlling disengaged mothers. Facilitative engaged mothers also averaged the highest scores on Response to Distress, followed by controlling engaged mothers, controlling disengaged mothers, and facilitative disengaged mothers, in that order.

As follow-up to the MANOVA, using the Bonferroni method at $p = .017$, ANOVA revealed maternal classifications approached significant difference on Sensitivity to Cues, $F(3, 112) = 3.42$, $p = .02$, $\eta^2 = .08$. ANOVA with Social-Emotional Growth Fostering and Cognitive Growth Fostering scores also revealed significant differences between maternal classifications, $\eta^2 = .14$ (observed power = .96) and $\eta^2 = .14$ (observed power = .96), respectively. However, Levene's test of equality of error variances revealed significant deviation between the groups for Social-Emotional Growth Fostering ($F(3, 112) = 3.02$, $p < .05$) and Cognitive Growth Fostering ($F(3, 112) = 13.91$, $p < .001$). Again, results must be interpreted with some caution.

Table 21

Multivariate and Univariate Analyses of Variance for 12-month NCAFS Caregiver Subscales ($N = 116$)

	Multivariate	Univariate			
Source	F[a]	Sensitivity to Cues[b]	Response to Distress[b]	Social-Emotional Growth Fostering[b]	Cognitive Growth Fostering[b]
Maternal[c]	2.53**	3.42	.30	6.10**	6.25**
MSE		2.19	1.61	1.30	.27

Note. Multivariate F ratio was generated from Pillai's statistic. [a]Multivariate $df = 12, 333$. [b]Univariate $df = 3, 112$. [c]12-month Snack Scale Maternal Classification.
** $p < .01$

Post hoc pairwise comparisons to determine which maternal classifications significantly differentiated the subscale scores were tested at the $p = .05$ level after Bonferroni correction for multiple comparisons. The only significant difference between any pairs of the maternal classifications on Social-Emotional Growth Fostering scores was between facilitative engaged and controlling disengaged mothers. Facilitative engaged mothers demonstrated significantly higher mean scores on Social-Emotional Growth Fostering than controlling disengaged mothers. In regard to Cognitive Growth Fostering, both facilitative engaged and controlling engaged mothers demonstrated significantly higher average scores than controlling disengaged mothers. There were no significant differences among any of the other pairwise comparisons for levels of Cognitive Growth Fostering.

An ANOVA was also performed to assess differences between 12-month Snack Scale maternal classifications in relation to 12-month NCAFS caregiver total scores (see Table 22 for means and standard deviations) and revealed significant differences, $F(3, 112) = 6.77$, $p < .001$. Post hoc analyses revealed that facilitative engaged mothers had significantly higher NCAFS maternal total scores than both facilitative disengaged and controlling disengaged mothers. No significant differences in NCAFS maternal total scores were found between facilitative engaged and controlling engaged mothers. There were also no significant differences between controlling engaged and facilitative disengaged mothers. Controlling engaged mothers did, however, have significantly higher NCAFS maternal scores than controlling disengaged mothers. There were no significant differences between facilitative disengaged and controlling disengaged mothers.

12-Month Child Assessment

MANOVA was performed with 12-month Snack Scale child classifications serving as grouping variables (engaged assertive, intermittently engaged, compliant disengaged, and active disengaged). Two dependent variables (NCAFS, 12 months) were included: Clarity of Cues and Responsiveness to Caregiver. Independent variables were Snack Scale child classifications. All 116 dyads were included in the analysis and no transformation of any of the variables was deemed necessary. See Table 23 for mean scores and standard deviations for the NCAFS child subscales by Snack Scale child classifications.

Table 23

Mean Scores and Standard Deviations for 12-month NCAFS Child Subscales as a Function of 12-month Snack Scale Child Classifications (N= 116)

	Clarity of Cues		Responsiveness to Caregiver	
Classification	*M*	*SD*	*M*	*SD*
Engaged Assertive	12.29	1.30	7.63	1.13
Intermittently Engaged	12.16	1.54	7.02	.95
Compliant Disengaged	11.74	1.44	6.55	1.21
Active Disengaged	11.33	1.55	6.00	1.00

The assumption of homogeneity of variance-covariance matrices was not violated (Box's $M = 4.24$, $F(9, 302) = .39$, $p > .05$). However, due to the discrepancy in sample sizes among the cells, with three children classified as active disengaged, Pillai's criterion was used to evaluate multivariate significance (Olson, 1979). Significant differences were

found among the four 12-month child classifications on the dependent measures, Pillai's $V = .14$, $F(6, 224) = 2.78$, $p < .05$; see Table 24. The multivariate η^2 based on Pillai's V was modest at .07 (observed power = .88). Means were in the expected direction based upon child classification and suggested that engaged assertive children demonstrated the highest mean levels of Clarity of Cues and Responsiveness to Caregiver, followed by intermittently engaged children who, in turn, demonstrated higher scores on these characteristics than compliant engaged children. Active disengaged children demonstrated the lowest scores on Clarity of Cues and Responsiveness to Caregiver.

ANOVAs were conducted for each of the dependent subscales as follow-up to the MANOVA. Using the Bonferroni method, each ANOVA was tested at the $p = .017$ level. Twelve-month child classifications significantly differed on the Responsiveness to Caregiver subscale, $\eta^2 = .13$ (observed power = .93).

Post hoc analysis consisted of pairwise comparisons between classification groups to determine which child classifications significantly differentiated the subscale score. Each pairwise comparison was tested at the $p = .05$ level after Bonferroni correction for multiple comparisons. This analysis revealed that children classified as engaged assertive demonstrated significantly higher scores on responsiveness to their mothers than did those classified as compliant disengaged. Those children classified as engaged assertive did not differ significantly from actively disengaged children despite there being the largest mean difference between these two groups of children. This was likely due to the limited number of children designated as actively disengaged ($n = 3$). There were no significant differences revealed by pairwise comparisons between any of the other classifications.

An ANOVA was also performed to assess differences between 12-month Snack Scale child classifications in relation to NCAFS 12-month child total scores (see Table 25 for means and standard deviations). Means were in the expected direction. The ANOVA yielded significant differences, $F(3, 112) = 3.99$, $p = .01$. Post hoc analyses revealed that engaged assertive children had significantly higher NCAFS child total scores than compliant disengaged children. There were no other significant differences between groups. As noted previously, engaged assertive children did not differ significantly from actively disengaged children despite there being the largest mean difference between these two groups of children. Again, this was likely due to the limited number of children designated as actively disengaged.

Table 24

Multivariate and Univariate Analyses of Variance for 12-month NCAFS Child Subscales ($N = 116$)

	Multivariate	Univariate	
Source	F[a]	Clarity of Cues[b]	Responsiveness to Caregiver[b]
Child[c]	2.78*	1.02	5.53***
MSE		2.14	1.13

Note. Multivariate F ratio was generated from Pillai's Statistic. [a]Multivariate $df = 6, 224$. [b]Univariate $df = 3, 112$. [c]12-month Snack Scale Child Classification.
* $p < .05$. *** $p < .001$.

24-Month Dyadic Assessment

MANOVA was performed with 24-month dyadic mutuality ratings serving as the grouping variable (poor, marginal, connected) in relation to six dependent variables (NCAFS, 24 months): Sensitivity to Cues, Response to Distress, Social-Emotional Growth Fostering, Cognitive Growth Fostering, Clarity of Cues, and Responsiveness to Caregiver. All 116 dyads were included in the analysis and no transformation of any of the variables was deemed necessary. See Table 26 for mean scores and standard deviations for the NCAFS subscales as a function of the Snack Scale mutuality classifications. See Table 27 for correlations among NCAFS subscales at 24 months.

Table 26

Mean Scores and Standard Deviations for 24-month NCAFS Subscales as a Function of 24-month Snack Scale Mutuality Classifications

	Sensitivity to Cues		Response to Distress		Social-Emotional Growth Fostering		Cognitive Growth Fostering		Clarity of Cues		Responsiveness to Caregiver	
Classification	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Connected	11.88	1.40	8.12	.86	12.35	.94	8.88	.33	12.23	1.39	7.31	1.12
Marginal	10.73	1.46	8.13	.92	11.89	1.21	8.89	.31	12.42	1.30	7.25	1.02
Poor	10.94	1.91	8.00	.87	11.20	1.62	8.77	.43	12.34	1.11	6.91	1.22

Table 27

Pearson's *R* Correlation Coefficients for Relations Among 24-month NCAFS Subscales

Measure	1	2	3	4	5	6
1. Sensitivity to Cues	--					
2. Response to Distress	.12	--				
3. Social-Emotional Growth Fostering	.17	.05	--			
4. Cognitive Growth Fostering	-.02	.12	.19*	--		
5. Clarity of Cues	-.01	-.01	.16	.10	--	
6. Responsiveness to Caregiver	.14	.09	.25**	.33**	.24*	--

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

The assumption of homogeneity of variance-covariance matrices was not violated at 24 months (Box's $M = 55.93$, $F(42, 21169) = 1.22$, $p > .05$) and sample cell sizes were deemed sufficient to use Wilks' L to evaluate multivariate significance. Significant differences were found among the three 24-month mutuality classifications on the dependent measures, Wilks' $L = .82$, $F(12, 216) = 1.90$, $p < .05$; see Table 28.

Table 28

Multivariate and Univariate Analyses of Variance for 24-month NCAFS Subscales

	Multivariate	Univariate					
Source	F^a	Sensitivity to Cues[b]	Response to Distress[b]	Social-Emotional Growth Fostering[b]	Cognitive Growth Fostering[b]	Clarity of Cues[b]	Responsiveness to Caregiver[b]
Mutuality[c]	1.90*	4.77**	.23	6.15**	1.35	.19	1.29
MSE		2.54	.80	1.69	.13	1.61	1.23

Note. Multivariate F ratio was generated from Wilks' statistic. [a]Multivariate $df = 12, 216$. [b]Univariate $df = 2, 113$. [c]24-month Snack Scale Mutuality Classification.
* $p < .05$. ** $p \leq .01$

The multivariate η^2 based on Wilks' L was modest at .10 (observed power = .90). As at 12 months, the pattern of means in Table 26 suggested that connected mothers demonstrated higher scores on Social-Emotional Growth Fostering than marginally connected mothers, who, in turn, demonstrated higher scores on these characteristics than poorly connected mothers. However, at 24 months, marginally connected mothers demonstrated slightly higher mean scores on Response to Distress and Cognitive Growth Fostering than connected mothers. This was a departure from the pattern noted at 12 months. Connected mothers demonstrated higher average mean scores on these characteristics than poorly connected mothers. In regard to Sensitivity to Cues, connected mothers demonstrated the highest scores among the classifications as at 12 months. However, poorly connected mothers had higher mean scores on Sensitivity to Cues than marginally connected mothers. This was again a departure from the pattern noted at 12 months.

The pattern of means in Table 26 also suggested that connected children demonstrated higher mean scores on Responsiveness to Caregiver than marginally connected children, who in turn demonstrated higher scores on this characteristic than poorly connected children. However, the pattern of means also suggested that marginally connected children had the highest scores on Clarity of Cues and that connected children had the lowest scores on this characteristic. This also represented a change from the pattern at 12 months.

ANOVAs were conducted for each of the dependent subscales as follow-up to the MANOVA. Using the Bonferroni method, each ANOVA was tested at the $p = .025$ level. Twenty-four months mutuality classifications significantly differed on scores of

Sensitivity to Cues and Social-Emotional Growth Fostering, $\eta^2 = .08$ (observed power = .78) and $\eta^2 = .10$ (observed power = .88), respectively.

Post hoc analyses consisted of pairwise comparisons between classification groups to determine which mutuality classifications significantly differentiated the subscale scores. Each pairwise comparison was tested at the $p = .05$ level after Bonferroni correction for multiple comparisons. Those dyads classified as connected had significantly higher scores on maternal Sensitivity to Cues than did those classified as marginal in mutuality. There were no significant differences between connected dyads and dyads with poor mutuality in terms of maternal Sensitivity to Cues. This is an unexpected finding in light of significant differences between dyads considered connected or marginal, however at 24 months mothers in dyads with poor mutuality had higher average Sensitivity to Cues scores than mothers in dyads with marginal mutuality. This was in contrast to the findings at 12 months.

Those dyads classified as connected had significantly higher scores on maternal Social-Emotional Growth Fostering than did those classified as poor. Dyads classified as marginal also had significantly higher scores on maternal Social-Emotional Growth Fostering than dyads poor in mutuality. There were no significant differences in scores on maternal Social-Emotional Growth Fostering between connected and marginal dyads. This finding was congruent with the finding at 12 months.

An ANOVA was also performed to assess differences between 24-month Snack Scale mutuality classifications in relation to 24-month NCAFS caregiver-child total scores (see Table 19 for means and standard deviations). The ANOVA revealed significant differences, $F(2, 113) = 4.19$, $p < .05$. Post hoc analyses revealed that dyads

classified as connected had significantly higher quality of feeding interaction as assessed by NCAFS caregiver-child total scores than did those dyads classified as poor in mutuality. This was not true of dyads classified as marginal in mutuality compared to those classified as poor in contrast to the finding at 12 months. Those dyads classified as connected and marginal were not significantly different from one another.

24-Month Maternal Assessment

Using 24-month maternal classifications as the grouping variable (facilitative engaged, controlling engaged, facilitative disengaged, and controlling disengaged) a MANOVA was performed on the four dependent variables (NCAFS, 24 months): Sensitivity to Cues, Response to Distress, Social-Emotional Growth Fostering, and Cognitive Growth Fostering. All 116 dyads were included in the analysis and no transformation of any of the variables was deemed necessary. See Table 29 for mean scores and standard deviations for the NCAFS maternal subscales as a function of the Snack Scale maternal classifications at 24 months.

Table 29

Mean Scores and Standard Deviations for 24-month NCAFS Caregiver Subscales as a Function of 24-month Snack Maternal Classifications ($N = 116$)

	Sensitivity To Cues		Response to Distress		Social-Emotional Growth Fostering		Cognitive Growth Fostering	
Classification	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Facilitative Engaged	11.79	1.32	8.17	.87	12.42	.88	8.88	.34
Controlling Engaged	11.14	1.80	8.14	.65	11.77	1.48	8.94	.24
Facilitative Disengaged	10.77	1.33	8.23	1.06	11.86	1.17	8.77	.43
Controlling Disengaged	10.55	1.95	7.68	.89	11.00	1.54	8.82	.39

The assumption of homogeneity of variance-covariance matrices was violated (Box's $M = 53.46$, $F(30, 25186) = 1.66$, $p \leq .01$); Pillai's criterion was used to evaluate multivariate significance (Olson, 1979). Significant differences were found among the four 24-month maternal classifications on the maternal subscale scores, Pillai's $V = .25$, $F(12, 333) = 2.47$, $p < .01$; see Table 30. The multivariate η^2 based on Pillai's V was modest, .08 (observed power = .97). The pattern of means suggested that facilitative engaged mothers scored the highest on sensitivity to cues, followed by controlling engaged mothers, facilitative disengaged mothers, and controlling disengaged mothers, in that order. Facilitative disengaged mothers scored slightly higher on responsiveness to child distress, followed by facilitative engaged mothers and controlling engaged mothers, who had comparable means; controlling disengaged mothers yielded the lowest mean score. In regard to Social-Emotional Growth Fostering, facilitative engaged mothers demonstrated the highest mean score, followed by comparable mean scores for facilitative disengaged mothers and controlling engaged mothers; controlling disengaged mothers had the lowest mean score. Controlling engaged mothers had the highest scores on Cognitive Growth Fostering, followed by comparable scores for facilitative engaged mothers; controlling disengaged mothers and facilitative disengaged mothers had slightly lower scores. All of these patterns differed from those found at 12 months.

As follow-up to the MANOVA, using the Bonferroni method at $p = .017$ level, separate ANOVA revealed maternal classifications significantly differed on Social-Emotional Growth Fostering, $\eta^2 = .11$ (observed power = .88). This was in contrast to 12 months when Cognitive Growth Fostering was also significant.

Table 30

Multivariate and Univariate Analyses of Variance for 24-month NCAFS Caregiver Subscales ($N = 116$)

	Multivariate	Univariate			
Source	F[a]	Sensitivity to Cues[b]	Response to Distress[b]	Social-Emotional Growth Fostering[b]	Cognitive Growth Fostering[b]
Maternal[c]	2.47**	2.81	1.97	4.62**	1.48
MSE		2.59	.77	1.68	.13

Note. Multivariate F ratio was generated from Pillai's statistic. [a]Multivariate $df = 12, 333$. [b]Univariate $df = 3, 112$. [c]24-month Snack Scale Maternal Classification.
** $p < .01$

Post hoc analysis of pairwise comparisons to determine which maternal classifications significantly differentiated the subscale scores was tested at the $p = .05$ level after Bonferroni correction for multiple comparisons. The only significant difference between any of the maternal classifications on Social-Emotional Growth Fostering scores was between facilitative engaged and controlling disengaged mothers. Facilitative engaged mothers demonstrated significantly higher mean scores on Social-Emotional Growth Fostering than did controlling disengaged mothers. This was true at 12 months, as well.

An ANOVA was also performed to assess differences between 24-month Snack Scale maternal classifications in relation to 24-month NCAFS caregiver total scores (See Table 22 for means and standard deviations) and yielded significant differences, $F(3, 112) = 6.64$, $p < .001$. Post hoc analyses revealed that facilitative engaged mothers had significantly higher NCAFS maternal total scores than controlling disengaged mothers. The significant difference between facilitative engaged and facilitative disengaged mothers at 12 months was no longer present at 24 months. As noted at 12 months, no significant differences in NCAFS maternal total scores were found between facilitative engaged and controlling engaged mothers. There were also no significant differences between controlling engaged and facilitative disengaged mothers. As at 12 months, controlling engaged mothers did, however, have significantly higher NCAFS maternal scores than controlling disengaged mothers. There were no significant differences on maternal scores between facilitative disengaged and controlling disengaged mothers.

24-Month Child Assessment

MANOVA was performed with 24-month Snack Scale child classifications serving as grouping variables (engaged assertive, intermittently engaged, compliant disengaged, and active disengaged). Two dependent variables (NCAFS, 24 months) were included: Clarity of Cues and Responsiveness to Caregiver. Independent variables were Snack Scale child classifications. All 116 dyads were included in the analysis and no transformation of any of the variables was deemed necessary. See Table 31 for mean scores and standard deviations for the NCAFS child subscales by Snack Scale child classifications.

Table 31

Mean Scores and Standard Deviations for 24-month NCAFS Child Subscales as a Function of 24-month Snack Scale Child Classifications (N= 116)

	Clarity of Cues		Responsiveness to Caregiver	
Classification	*M*	*SD*	*M*	*SD*
Engaged Assertive	12.12	1.37	7.31	1.09
Intermittently Engaged	12.73	1.27	7.23	1.06
Compliant Disengaged	12.04	1.06	6.88	1.13
Active Disengaged	12.35	1.67	7.18	1.29

The assumption of homogeneity of variance-covariance matrices was not violated (Box's $M = 6.01$, $F(9, 40359) = .64$, $p > .05$) and sample cell sizes were deemed sufficient to use Wilks' L to evaluate multivariate significance. Significant differences were not found among the four child classifications on the dependent measures, Wilks' L

= .92, $F(6, 222) = 1.57$, $p > .05$, $\eta^2 = .04$; see Table 32. This was in contrast to the finding at 12 months.

ANOVAs were conducted for each of the dependent subscales as follow-up to the MANOVA. Using the Bonferroni method, each ANOVA was tested at the $p = .017$ level. Neither was significant. This was in contrast to the finding of significance of Responsiveness to Caregiver at 12 months. No post hoc analyses were conducted.

An ANOVA was also performed to assess differences between 24-month Snack Scale child classifications in relation to NCAFS child total scores (see Table 25 for means and standard deviations). Means were not in the expected direction in comparison to 12 months. The ANOVA did not uncover significant differences, $F(3, 112) = 1.89$, p =.14. Post hoc analyses were not conducted.

Table 32

Multivariate and Univariate Analyses of Variance for 24-month NCAFS Child Subscales ($N = 116$)

	Multivariate	Univariate	
Source	F[a]	Clarity of Cues[b]	Responsiveness to Caregiver[b]
Child[c]	1.57	2.55	.74
MSE		1.53	1.24

Note. Multivariate F ratio was generated from Wilks' Statistic. [a]Multivariate $df = 6, 222$. [b]Univariate $df = 3, 112$. [c]24-month Snack Scale Child Classification.

36-Month Dyadic Assessment

MANOVA was performed with 36-month dyadic mutuality ratings serving as the grouping variable (poor, marginal, connected) in relation to six dependent variables (NCAFS, 36 months): Sensitivity to Cues, Response to Distress, Social-Emotional Growth Fostering, Cognitive Growth Fostering, Clarity of Cues, and Responsiveness to Caregiver. All 116 dyads were included in the analysis and no transformation of any of the variables was deemed necessary. See Table 33 for mean scores and standard deviations for the NCAFS subscales as a function of the Snack Scale mutuality classifications. See Table 34 for correlations among NCAFS subscales at 36 months.

Table 33

Mean Scores and Standard Deviations for 36-month NCAFS Subscales as a Function of 36-month Snack Scale Mutuality Classifications

	Sensitivity to Cues		Response to Distress		Social-Emotional Growth Fostering		Cognitive Growth Fostering		Clarity of Cues		Responsiveness to Caregiver	
Classification	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Connected	11.28	1.37	8.44	.65	12.12	1.33	9.00	.00	12.48	1.08	7.72	.84
Marginal	11.27	1.08	8.32	1.04	11.94	.98	8.97	.18	12.05	1.43	7.21	.99
Poor	10.46	1.20	7.82	.94	11.21	1.23	8.71	.71	11.86	1.41	6.82	1.02

Table 34

Pearson's *R* Correlation Coefficients for Relations Among 36-month NCAFS Subscales

Measure	1	2	3	4	5	6
1. Sensitivity to Cues	--					
2. Response to Distress	.21*	--				
3. Social-Emotional Growth Fostering	.01	.31**	--			
4. Cognitive Growth Fostering	.13	.26**	.23*	--		
5. Clarity of Cues	.06	.01	-.10	.07	--	
6. Responsiveness to Caregiver	.14	.05	.22*	.10	.16	--

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

The assumption of homogeneity of variance-covariance matrices was violated (Box's $M = 100.46$, $F(21, 10733) = 4.35$, $p < .001$). Pillai's criterion was used to evaluate multivariate significance (Olson, 1979). Significant differences were found among the three mutuality classifications on the dependent measures, Pillai's $V = .28$, $F(12, 218) = 2.94$, $p \leq .001$; see Table 35.

The multivariate η^2 based on Pillai's V was modest at .14 (observed power = .99). The pattern of means in Table 33 suggests that connected mothers demonstrated slightly higher levels of Sensitivity to Cues, Response to Distress, Social-Emotional Growth Fostering, and Cognitive Growth Fostering than did marginally connected mothers, who, in turn, demonstrated slightly higher levels of these characteristics than poorly connected

mothers. The same pattern was apparent for children in terms of Clarity of Cues and Responsiveness to Caregiver. This pattern of means is identical to that observed at 12 months.

ANOVAs were conducted for each of the dependent subscales as follow-up to the MANOVA. Using the Bonferroni method, each ANOVA was tested at the $p = .025$ level. Thirty-six month mutuality classifications significantly differed on Sensitivity to Cues, $\eta^2 = .08$ (observed power = .81), Social-Emotional Growth Fostering scores, $\eta^2 = .09$ (observed power = .83), Cognitive Growth Fostering, $\eta^2 = .09$ (observed power = .83), and Responsiveness to Caregiver, $\eta^2 = .09$ (observed power = .86). However, Levene's test of equality of error variances revealed significant deviations among classification groups for Social-Emotional Growth Fostering ($F(2, 113) = 3.18, p < .05$) and Cognitive Growth Fostering ($F(2, 113) = 27.87, p < .001$); these results must be interpreted with some caution.

Post hoc analyses consisted of pairwise comparisons between classification groups to determine which mutuality classifications significantly differentiated the subscale score. Each pairwise comparison was tested at the .05 level after Bonferroni correction for multiple comparisons. Those dyads classified as connected had significantly higher scores on maternal Sensitivity to Cues, Social-Emotional and Cognitive Growth Fostering, and child Responsiveness to Caregiver than did those dyads classified as poor in mutuality. Dyads classified as marginal in mutuality also scored significantly higher on maternal Sensitivity to Cues and Social-Emotional and Cognitive Growth Fostering than did dyads classified as poor in mutuality. There were no significant differences between dyads considered connected versus marginal in mutuality

on these subscales. The findings for Social-Emotional Growth Fostering were consistent with those at 12 and 24 months. The significant differences between dyads considered connected and poor in regard to maternal Cognitive Growth Fostering and child Responsiveness to Caregiver also paralleled the findings at 12 months.

An ANOVA was also performed to assess differences between 36-month Snack Scale mutuality classifications in relation to NCAFS caregiver-child total scores (see Table 19 for means and standard deviations). The ANOVA revealed significant differences, $F(2, 113) = 15.72$, $p < .001$. Post hoc analyses demonstrated that dyads classified as connected had significantly higher quality of feeding interaction as assessed by NCAFS caregiver-child total scores than did those dyads classified as poor in mutuality. The same was true of dyads classified as marginal in mutuality compared to those classified as poor. Those dyads classified as connected and marginal were not significantly different from one another. This finding was consistent with the finding at 12 months. At all three time periods, connected dyads had significantly higher quality of feeding interaction than dyads poor in mutuality. The pattern of means was also in the expected direction at each time period.

Table 35

Multivariate and Univariate Analyses of Variance for 36-month NCAFS Subscales

	Multivariate	Univariate					
Source	F[a]	Sensitivity to Cues[b]	Response to Distress[b]	Social-Emotional Growth Fostering[b]	Cognitive Growth Fostering[b]	Clarity of Cues[b]	Responsiveness to Caregiver[b]
Mutuality[c]	2.94***	5.02**	3.47	5.27**	5.37**	1.47	5.74**
MSE		1.38	.90	1.27	.14	1.85	.93

Note. Multivariate F ratio was generated from Pillai's statistic. [a]Multivariate $df = 12, 216$. [b]Univariate $df = 2, 113$. [c]36-month Snack Scale Mutuality Classification.
** $p < .01$, *** $p < .001$.

36-Month Maternal Assessment

Using 36-month maternal classifications as the grouping variable (facilitative engaged, controlling engaged, facilitative disengaged, and controlling disengaged) a MANOVA was performed on the four dependent variables (NCAFS, 36 months): Sensitivity to Cues, Response to Distress, Social-Emotional Growth Fostering, and Cognitive Growth Fostering. All 116 dyads were included in the analysis and no transformation of any of the variables was deemed necessary. See Table 36 for mean scores and standard deviations for the NCAFS maternal subscales as a function of the Snack Scale maternal classifications at 36 months.

Table 36

Mean Scores and Standard Deviations for 36-month NCAFS Caregiver Subscales as a Function of 36-month Snack Maternal Classifications ($N = 116$)

	Sensitivity To Cues		Response to Distress		Social-Emotional Growth Fostering		Cognitive Growth Fostering	
Classification	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Facilitative Engaged	11.33	1.37	8.42	.65	12.13	1.36	9.00	.00
Controlling Engaged	11.18	1.31	8.39	1.07	11.86	1.04	8.93	.26
Facilitative Disengaged	11.11	1.02	8.32	1.03	12.08	.86	9.00	.00
Controlling Disengaged	10.70	1.20	7.74	.90	11.07	1.21	8.70	.72

The assumption of homogeneity of variance-covariance matrices was violated (Box's $M = 32.93$, $F(10, 13386) = 3.02$, $p < .01$); Pillai's criterion was used to evaluate multivariate significance (Olson, 1979). Significant differences were found among the four 36-month maternal classifications on the maternal subscale scores, Pillai's $V = .22$, $F(12, 333) = 2.20$, $p < .01$; see Table 37. The multivariate η^2 based on Pillai's V was modest, .07 (observed power = .95). The pattern of means suggests that facilitative engaged mothers had the highest scores on sensitivity to cues, followed by controlling engaged mothers, facilitative disengaged mothers, and controlling disengaged mothers, respectively. This pattern was consistent with the one at 24 months. Facilitative engaged mothers had the highest scores on responsive to child distress, followed by controlling engaged mothers, then facilitative disengaged mothers, and finally controlling disengaged mothers. This represented a new pattern involving Response to Distress. In regard to Social-Emotional Growth Fostering, facilitative engaged mothers demonstrated the scores, followed by facilitative disengaged mothers, controlling engaged mothers, and controlling disengaged mothers, in that order. This pattern also paralleled that of 24 months. Facilitative engaged mothers had the highest scores on Cognitive Growth Fostering, followed by facilitative disengaged mothers, then controlling engaged mothers, and finally controlling disengaged mothers. As with Response to Distress, this pattern differed from those at 12 and 24 months which, in turn, differed from one another.

Table 37

Multivariate and Univariate Analyses of Variance for 36-month NCAFS Caregiver Subscales ($N = 116$)

	Multivariate	Univariate			
Source	F[a]	Sensitivity to Cues[b]	Response to Distress[b]	Social-Emotional Growth Fostering[b]	Cognitive Growth Fostering[b]
Maternal[c]	2.20**	1.28	3.13	5.40**	3.98**
MSE		1.47	.89	1.22	.14

Note. Multivariate F ratio was generated from Pillai's statistic. [a]Multivariate $df = 12, 333$. [b]Univariate $df = 3, 112$. [c]36-month Snack Scale Maternal Classification.
** $p < .01$

As follow-up test to the MANOVA, using the Bonferroni method at $p = .017$ level, separate ANOVAs revealed maternal classifications significantly differed on Social-Emotional Growth Fostering and Cognitive Growth Fostering, $\eta^2 = .13$ (observed power = .93) and $\eta^2 = .10$ (observed power = .82), respectively. However, Levene's test of equality of error variances uncovered significant deviation between groups for Cognitive Growth Fostering ($F(3, 112) = 21.99$, $p < .001$) so its results must be interpreted with some caution.

Post hoc analyses of pairwise comparisons to determine which maternal classifications significantly differentiated the subscale scores were tested at $p = .05$ after Bonferroni correction for multiple comparisons. Facilitative engaged mothers yielded significantly higher scores on Social-Emotional Growth Fostering than controlling disengaged mothers. The same was true of facilitative disengaged mothers in comparison to controlling disengaged mothers. The difference between controlling engaged mothers and controlling disengaged mothers approached significance ($p = .06$), with controlling engaged mothers demonstrating higher scores on Social-Emotional Growth Fostering than controlling disengaged mothers. Facilitative engaged mothers had significantly higher scores on Social-Emotional Growth Fostering than controlling disengaged mothers consistently at 12, 24, and 36 months. The significant difference between facilitative disengaged mothers and controlling disengaged mothers at 36 months was unique to this time period.

In terms of Cognitive Growth Fostering, both facilitative engaged and facilitating disengaged mothers demonstrated significantly higher scores than controlling disengaged mothers. There were no significant differences among any of the other comparisons for

scores on Cognitive Growth Fostering. The significant difference between facilitative engaged mothers and controlling disengaged mothers was consistent with the finding at 12 months. The finding of a significant difference between facilitative engaged mothers and controlling disengaged mothers was unique to 36 months.

An ANOVA was also performed to assess differences between 36-month Snack Scale maternal classifications in relation to 36-month NCAFS caregiver total scores (see Table 22 for means and standard deviations) and revealed significant differences, $F(3, 112) = 8.17$, $p < .001$. Post hoc analyses revealed that facilitative engaged mothers had significantly higher NCAFS maternal total scores than controlling disengaged mothers. This was consistent at 12, 24, and 36 months. No significant differences in NCAFS maternal total scores were found between facilitative engaged, controlling engaged, and facilitative disengaged mothers. This was true at 24 months, as well, but was in contrast to the finding of facilitative engaged mothers having significantly higher NCAFS maternal total scores than facilitative disengaged mothers at 12 months. There were no significant differences between controlling engaged and facilitative disengaged mothers. Controlling engaged mothers did, however, have significantly higher NCAFS maternal scores than controlling disengaged mothers. Both of these findings were also true at 12 and 24 months. Finally, facilitative disengaged mothers had significantly higher NCAFS maternal scores than controlling disengaged mothers. This was unique to 36 months.

36-Month Child Assessment

MANOVA was performed with 36-month Snack Scale child classifications serving as grouping variables (engaged assertive, intermittently engaged, compliant disengaged, and active disengaged). Two dependent variables (NCAFS, 36 months) were

included: Clarity of Cues and Responsiveness to Caregiver. The independent variable was Snack Scale child classifications. All 116 dyads were included in the analysis and no transformation of any of the variables was deemed necessary. See Table 38 for mean scores and standard deviations for the NCAFS child subscales by Snack Scale child classifications.

Table 38

Mean Scores and Standard Deviations for 36-month NCAFS Child Subscales as a Function of 36-month Snack Scale Child Classifications (*N*= 116)

	Clarity of Cues		Responsiveness to Caregiver	
Classification	*M*	*SD*	*M*	*SD*
Engaged Assertive	12.48	1.04	7.61	.78
Intermittently Engaged	12.20	1.38	7.21	.91
Compliant Disengaged	11.60	1.52	6.97	1.25
Active Disengaged	12.14	1.07	7.14	1.07

The assumption of homogeneity of variance-covariance matrices was not violated (Box's $M = 17.78$, $F(9, 3483) = 1.85$, $p > .05$). However, due to the discrepancy in sample size among the cells, with seven children classified as Active Disengaged, Pillai's criterion was used to evaluate multivariate significance (Olson, 1979). Significant differences were not found among the four child classifications on the dependent measures, Pillai's $V = .09$, $F(6, 224) = 1.71$, $p > .05$; see Table 39. The multivariate η^2 based on Pillai's V was small, .04. This was in contrast to the finding at 12 months, but the finding of no significant difference was congruent with the finding at 24 months.

ANOVAs were conducted for each of the dependent subscales as follow-up to the MANOVA. Using the Bonferroni method, each ANOVA was tested at the $p = .017$ level. Neither of the ANOVA was significant. This was in contrast to the finding for significant differences on Responsiveness to Caregiver at 12 months, but consistent with the finding at 24 months. No post hoc analyses were conducted.

An ANOVA was also performed to assess differences between 36-month Snack Scale child classifications in relation to NCAFS 36-month child total scores (see Table 25 for means and standard deviations). Means were not in the expected direction in comparison to 12 months and differed in pattern compared to those at 24 months. The ANOVA revealed significant differences, $F(3, 112) = 3.33$, $p < .05$. Post hoc analyses revealed that engaged assertive children had significantly higher NCAFS child total scores than compliant disengaged children. There were no other significant differences between groups. This is consistent with the finding at 12 months.

Table 39

Multivariate and Univariate Analyses of Variance for 36-month NCAFS Child Subscales ($N = 116$)

	Multivariate	Univariate	
Source	F[a]	Clarity of Cues[b]	Responsiveness to Caregiver[b]
Child[c]	1.73	2.09	1.84
MSE		1.81	.99

Note. Multivariate F ratio was generated from Wilks' Statistic. [a]Multivariate $df = 6, 222$. [b]Univariate $df = 3, 112$. [c]36-month Snack Scale Child Classification.

Table 19

Mean and Standard Deviations for NCAFS Caregiver-Child Total Scores and Snack Scale Mutuality Classifications ($N = 116$)

	12 mos			24 mos			36 mos		
Classification	*n*	*M*	*SD*	*n*	*M*	*SD*	*n*	*M*	*SD*
Connected	19	61.37	3.04	26	60.77	3.55	25	61.04	3.12
Marginal	68	59.13	3.98	55	59.31	3.16	63	59.75	2.45
Poor	29	56.55	3.54	35	58.17	3.85	28	56.89	3.30

Table 22

Means and Standard Deviations for NCAFS Caregiver Total Scores and Snack Scale Maternal Classifications ($N = 116$)

	12 mos			24 mos			36 mos		
Classification	*n*	*M*	*SD*	*n*	*M*	*SD*	*n*	*M*	*SD*
Facilitative Engaged	21	41.67	1.77	24	41.25	1.92	24	40.88	2.21
Controlling Engaged	25	40.60	2.94	35	40.00	2.62	28	40.36	2.08
Facilitative Disengaged	42	39.48	2.98	35	39.63	2.25	37	40.51	1.87
Controlling Disengaged	28	38.21	3.15	22	38.05	2.98	27	38.22	2.64

Table 25

Means and Standard Deviations for NCAFS Child Total Scores and Snack Child Classifications ($N = 116$)

	12 mos			24 mos			36 mos		
Classification	*n*	*M*	*SD*	*n*	*M*	*SD*	*n*	*M*	*SD*
Engaged Assertive	24	19.92	1.84	26	19.42	2.02	23	20.09	1.53
Intermittently Engaged	58	19.17	1.92	48	19.96	1.70	56	19.41	1.72
Compliant Disengaged	31	18.29	2.12	25	18.92	1.85	30	18.57	1.94
Active Disengaged	3	17.33	2.03	17	19.29	1.96	7	19.29	1.98

Summary of the Examination of Convergent Validity

Significant differences were found among the Snack Scale mutuality classifications on the NCAFS subscales at 12, 24, and 36 months. The pattern of mean scores followed expected directions at 12 and 36 months, but only two of the six subscales (Social-Emotional Growth Fostering and Responsiveness to Caregiver) maintained this pattern at 24 months. Social-Emotional Growth Fostering appeared to be the most consistent contributor to the classification differentiation over time. Significant differences were also found among Snack Scale mutuality classifications on the NCAFS caregiver-child total scale consistently at each age. Connected dyads consistently had significantly higher caregiver-child total scores than did those dyads classified as poor in mutuality. Dyads considered marginal in mutuality also had significantly higher

caregiver-child total scores than did those dyads classified as poor in mutuality at 12 and 36 months, but not at 24 months. There were no occasions of significant difference between connected and marginal dyads on the NCAFS caregiver-child total scale.

Significant differences were found among the Snack Scale maternal classifications on the NCAFS maternal subscales consistently at each age. The most recurrent pattern of difference on the four maternal subscales was facilitative engaged mothers having higher subscale scores than controlling disengaged mothers. Social-Emotional Growth Fostering and Cognitive Growth Fostering were the most consistent contributors to differentiation among the Snack Scale maternal classifications. Significant differences were also found among Snack Scale maternal classifications on the NCAFS caregiver total scale consistently at each age. The two consistent differentiation patterns were facilitative engaged mothers and controlling engaged mothers both having significantly higher maternal total scores than controlling disengaged mothers. There were no occasions of significant difference between the two engaged maternal classifications.

Significant differences among the Snack child classifications on NCAFS child subscales were only found at 12 months. The patterns of mean scores were in the expected direction on both NCAFS child subscales. This differentiation appeared to be driven by Responsiveness to Caregiver, with children classified as engaged assertive having significantly higher mean scores than children classified as compliant disengaged. Significant differences were also found among Snack Scale child classifications on the NCAFS child total scale at 12 and 36 months. At both ages, children classified as

engaged assertive had significantly higher child total scores than children classified as compliant disengaged.

Maternal and Child Contributions to Feeding Interaction Quality

The second aim of this study was to assess how maternal characteristics of maternal relationship history of care and overprotection/control with their own parents (PBI) and maternal beliefs related to child development (CODQ) and child temperament difficulty contribute to variations in the quality of feeding interactions as measured by the NCAFS. Recall that, given the relative stability of these maternal and child characteristics over time, the 24-month PBI scores, 12-month CODQ scores, and 12-month total child difficulty scores were used as predictors for 12-, 24-, and 36-month NCAFS scores. Separate multiple regression analyses were conducted in which NCAFS caregiver-child total scores, caregiver scores, and child scores served as dependent variables.

Sequential regression was used at each time period with the entry order of predictor variables determined by their modifiability. Child temperament difficulty score was entered first since it is considered a constitutional characteristic of the child that generally maintains stability over time (McClowry, 1992), including during toddlerhood (Houck, 1999). Maternal relationship history of care and overprotection/control score was entered next because individuals may be able to modify their internal working models of self and others within relationships, yet the historical events precipitating formation of the initial working model are unalterable. Maternal concepts of child development were entered in the final step because, as a cognitive variable, they represent a characteristic that is potentially open to modification through education. Maternal concept of

development scores were significantly positively correlated with maternal education categories, $r = .23$, $p < .05$. Thus, the higher the mother's education level, the more likely she was to have a multi-causal explanation for her child's behaviors. Analyses were performed with SPSS REGRESSION and FREQUENCIES for evaluation of assumptions.

12 Months

Transformation of the variables was not deemed necessary for any of the three analyses. There were no suppressor variables and no missing data, $N = 116$. Table 40 displays the means, standard deviations, and correlations between the variables. None of the predictor variables were significantly correlated with one another. Of the three predictor variables, only maternal concepts of development scores were significantly correlated with NCAFS caregiver-child total scores ($r = .23$, $p < .01$) and caregiver total scores ($r = .23$, $p < .01$). Thus, mothers with a more multi-causal perspective of child development were associated with higher NCAFS caregiver-child total and caregiver total scores, indicating more positive quality of interaction. These significant correlations appeared to be driven by significant positive correlations between maternal concepts of development and maternal sensitivity to cues ($r = .22$, $p < .01$), social-emotional growth fostering ($r = .17$, $p < .05$), and cognitive growth fostering ($r = .18$, $p < .05$).

The unstandardized regression coefficients (B), standard error of the unstandardized regression coefficients (SEB), the standardized regression coefficients (β), R^2, and change in R^2 (ΔR^2) at each step for the NCAFS caregiver-child total scores are shown in Table 41. After step 3, with all of the predictor variables in the equation,

there was a trend for NCAFS total scores to be predicted by the maternal and child characteristics, $R = .24$, $F(3, 112) = 2.19$, $p = .09$.

See Table 42 for the unstandardized regression coefficients (B), standard error of the unstandardized regression coefficients (SEB), the standardized regression coefficients (β), R^2, and change in R^2 (ΔR^2) at each step for the NCAFS caregiver total scores. R was significantly different from zero at step 3, $R = .27$, $F(3, 112) = 2.89$, $p < .05$. Thus, addition of concepts of development scores to the equation led to reliable improvement in R^2 and the overall equation accounted for 4.7% of the variance (adjusted $R^2 = .047$) in NCAFS caregiver total scores.

Table 43 displays the unstandardized regression coefficients (B), standard error of the unstandardized regression coefficients (SEB), the standardized regression coefficients (β), R^2, and change in R^2 (ΔR^2) at each step for the NCAFS child total scores. R was not significantly different from zero at the end of any of the three steps. After step 3, with all the predictor variables in the equation, $R = .13$, $F(3, 112) = .62$, $p = .60$.

24 Months

Transformation of the variables was not deemed necessary for any of the three analyses; there were no suppressor variables and no missing data ($N = 116$). See Table 40 for the means and standard deviations and the correlations between the variables. None of the predictor variables were significantly correlated with one another. Of the three predictor variables, child temperament and maternal concepts of development scores were significantly correlated with NCAFS caregiver-child total scores. These correlations were $r = .16$, $p < .05$ and $r = .26$, $p < .01$, respectively. Thus, the more difficult a child's temperament, the more likely the child tended to be in a dyad with higher NCAFS dyadic

feeding quality scores compared to those children with less difficult temperaments. Further analysis of this revealed a significant positive correlations between the child's reported temperamental difficulty and the child's responsiveness, $r = .17, p < .05$. Maternal concepts of development scores were also significantly associated with NCAFS caregiver total scores ($r = .21, p < .01$) and child total scores ($r = .21, p < .05$). Thus, at 24 months, mothers with a more multi-causal perspective of child development were associated with higher NCAFS dyadic total, caregiver total, and child total scores, indicating more positive quality of interactions. Further analysis of the child scores revealed a significant positive correlation between maternal concepts of development and the child's clarity of cues, $r = .18, p < .05$. Maternal concepts of development were also positively correlated with maternal response to the child's distress ($r = .16, p < .05$) and social-emotional growth fostering ($r = .27, p < .01$).

Again, the unstandardized regression coefficients (B), standard error of the unstandardized regression coefficients (SEB), the standardized regression coefficients (β), R^2, and change in R^2 (ΔR^2) at each step for the NCAFS caregiver-child total scores are shown in Table 41. After step 3, with all of the predictor variables in the equation, $R = .33, F(3, 112) = 4.46, p < .01$. Addition of maternal concepts of development to the equation led to reliable improvement in R^2 and the overall equation accounted for 8.3% of the variance (adjusted $R^2 = .083$) in NCAFS caregiver-child total scores. This stands in contrast to 12 months in which the three predictor variables did not account for any significant variance in caregiver-child total scores.

See Table 42 for the unstandardized regression coefficients (B), standard error of the unstandardized regression coefficients (SEB), the standardized regression coefficients

(β), R^2, and change in R^2 (ΔR^2) at each step for the NCAFS caregiver total scores. R was significantly different from zero only at step 3. After step 3, $R = .26$, $F(3, 112) = 2.62$, $p \leq .05$. Thus, the addition of concepts of development to the equation led to reliable improvement in R^2 and the overall equation accounted for 6.6% of the variance (adjusted $R^2 = .066$) in NCAFS caregiver total scores. At 12 months, these predictors accounted for 4.7% of the variance in these NCAFS scores.

In Table 43 the unstandardized regression coefficients (B), standard error of the unstandardized regression coefficients (SEB), the standardized regression coefficients (β), R^2, and change in R^2 (ΔR^2) at each step for the NCAFS child total scores are shown. R was significantly different from zero only at step three. After step 3, with all of the predictor variables in the equation, $R = .26$, $F(3, 112) = 2.75$, $p < .05$. The addition of maternal concepts of development to the equation led to reliable improvement in R^2 and the overall equation accounted for 6.9% of the variance (adjusted $R^2 = .069$) in NCAFS child total scores. This stands in contrast to 12 months in which the three predictor variables did not account for any significant variance in child total scores.

36 Months

Transformation of variables was not deemed necessary for any of the three analyses, although there was one case (Dyad 129) that represented a multivariate outlier due to a lower than average maternal total score. A decision was made to keep this dyad in the analysis without transformation or change in maternal scores. There were no suppressor variables and no missing data, $N = 116$. See Table 40 for the means, standard deviations, and correlations between the variables. Again, none of the predictor variables were significantly correlated with one another. Of the three predictor variables, only

maternal concepts of development scores were significantly correlated and these correlations were with NCAFS caregiver-child total scores ($r = .18$, $p < .01$) and caregiver total scores ($r = .23$, $p < .01$). As at 12 and 24 months, a more multi-causal perspective of child development was associated with higher NCAFS caregiver-child total and caregiver total scores. This appeared to be driven by a significant positive correlation between maternal concepts of development and maternal cognitive growth fostering ($r = .23$, $p < .01$). The significant positive correlation between maternal concepts of development and child total scores present at 24 months was no longer present at 36 months.

The unstandardized regression coefficients (B), standard error of the unstandardized regression coefficients (SEB), the standardized regression coefficients (β), R^2, and change in R^2 (ΔR^2) at each step for the NCAFS caregiver-child total scores are shown in Table 41. After step 3, with all of the predictor variables in the equation, there was a trend for NCAFS total scores to be predicted by the maternal and child characteristics, $R = .24$, $F(3, 112) = 2.19$, $p = .09$.

The unstandardized regression coefficients (B), standard error of the unstandardized regression coefficients (SEB), the standardized regression coefficients (β), R^2, and change in R^2 (ΔR^2) at each step for the NCAFS caregiver total scores are found in Table 42. R was significantly different from zero at step 3, $R = .26$, $F(3, 112) = 2.68$, $p \leq .05$. Addition of concepts of development scores to the equation led to reliable improvement in R^2 and the overall equation accounted for 4.2% of the variance (adjusted $R^2 = .042$) in NCAFS caregiver total scores. Recall that, at 12 months, the equation with

the three predictors accounted for 4.7% of the variance in caregiver total scores and, at 24 months, the equation accounted for 6.6% of this variance.

See Table 43 for the unstandardized regression coefficients (B), standard error of the unstandardized regression coefficients (SEB), the standardized regression coefficients (β), R^2, and change in R^2 (ΔR^2) at each step for the NCAFS child total scores. R was not significantly different from zero at the end of any of the three steps. After step 3, with all the predictor variables in the equation, $R = .11$, $F(3, 112) = .42$, $p = .74$. This non-significant result is congruent with the results at 12 months.

Summary of Maternal and Child Contributions to Feeding Interaction Quality

Maternal concepts of development scores were significantly positively correlated with NCAFS caregiver and caregiver-child total scores at each age. Thus, mothers with increasingly multi-causal perspectives of child development were associated with higher NCAFS caregiver-child total and caregiver total scores, indicating more positive quality of interaction, at each age. At 24 months, maternal concepts of development scores were also significantly positively correlated with NCAFS child total scores. Also at 24 months, child temperamental difficulty was positively correlated with NCAFS caregiver-child total scores. Thus, the more difficult a child's temperament, the more likely the child tended to be in a dyad with higher NCAFS dyadic feeding quality scores compared to those children with less difficult temperaments. Maternal early relationship history and child temperament were not found to be uniquely predictive of caregiver-child, caregiver, or child total scores at any age. Maternal concepts of development scores, however, were found to uniquely account for variance ranging from 4.7% to 5.1% in caregiver total scores. The median variance in caregiver total scores accounted for by maternal concepts

of development was 4.9 percent. At 24 months, maternal concepts of development scores also accounted for 7.4% of the variance in caregiver-child total scores and 4.5% of the variance in child total scores.

Overall, the variance accounted for by the three variables in this series of multiple regressions was relatively low. In power analysis for multiple regression, assuming multiple $R^2 = .06$ and any one variable uniquely accounting for 2%, with a power of .80 and an alpha = .05, the study would have needed 371 dyads to pick up such small effect sizes. The observed power was .34.

Table 40

Means, Standard Deviations, and Intercorrelations for NCAFS Scores and Maternal and Child Predictor Variables (N =116)

Variable	*M*	*SD*	1	2	3
Predictor variable					
1. Child Temperament[a]	19.65	2.05	--	-.13	-.02
2. Maternal Relationship History[b]	93.27	23.69	--	--	-.06
3. Maternal Concepts of Development[c]	61.86	5.10	--	--	--
NCAFS Caregiver Total					
12 months	39.81	3.05	.05	-.14	.23**
24 months	39.78	2.63	.12	.05	.21**
36 months	40.02	2.38	-.11	-.07	.23**
NCAFS Child Total					
12 months	19.04	2.03	.02	.08	.10
24 months	19.52	1.87	.13	.06	.21*
36 months	19.32	1.82	-.10	-.03	.01
NCAFS Caregiver-Child Total					
12 months	58.85	4.02	.05	-.07	.23**
24 months	59.29	3.56	.16*	.07	.26**
36 months	59.34	3.16	-.13	-.07	.18**

Note. [a]Child temperament total difficulty scores at 12 months. [b]Parental Bonding Instrument scores at 24 months. [c]Maternal Concept of Development Questionnaire scores at 12 months.
$p < .05$. ** $p < .01$

Table 41

Hierarchical Regression Analysis Summary for Maternal and Child Variables Predicting NCAFS Caregiver-Child Total Scores

	12 months					24 months					36 months				
Variable	B	SEB	β	R^2	ΔR^2	B	SEB	β	R^2	ΔR^2	B	SEB	β	R^2	ΔR^2
Step 1				.002					.024					.018	
Child Temperament[a]	.09	.18	.05			.30	.16	.18			-.22	.14	-.14		
Step 2				.006	.004				.033	.008				.026	.008
Maternal Relationship History[b]	-.01	.02	-.05			.02	.01	.11			-.01	.01	-.08		
Step 3				.055	.049*				.107**	.074**				.055	.030
Maternal Concepts of Development[c]	.18	.07	.22*			.19	.06	.27**			.11	.06	.17		

Note. [a]Child temperament total difficulty scores at 12 months. [b]Parental Bonding Instrument scores at 24 months. [c]Maternal Concept of Development Questionnaire scores at 12 months.
* $p \leq .05$. ** $p < .01$.

Table 42

Hierarchical Regression Analysis Summary for Maternal and Child Variables Predicting NCAFS Caregiver Total Scores

	12 months					24 months					36 months				
Variable	B	SEB	β	R^2	ΔR^2	B	SEB	β	R^2	ΔR^2	B	SEB	β	R^2	ΔR^2
Step 1				.002					.014					.011	
Child Temperament[a]	.06	.14	.04			.17	.12	.13			-.13	.11	-.11		
Step 2				.021	.019				.018	.005				.018	.007
Maternal Relationship History[b]	-.02	.01	-.12			.01	.01	.08			-.01	.01	-.07		
Step 3				.072*	.051*				.066*	.047*				.067*	.049*
Maternal Concepts of Development[c]	.14	.05	.23*			.11	.05	.22*			.10	.04	.22*		

Note. [a]Child temperament total difficulty scores at 12 months. [b]Parental Bonding Instrument scores at 24 months. [c]Maternal Concept of Development Questionnaire scores at 12 months.
* $p \leq .05$.

Table 43

Hierarchical Regression Analysis Summary for Maternal and Child Variables Predicting NCAFS Child Total Scores

	12 months					24 months					36 months				
Variable	B	SEB	β	R^2	ΔR^2	B	SEB	β	R^2	ΔR^2	B	SEB	β	R^2	ΔR^2
Step 1				.000					.018					.009	
Child Temperament[a]	.03	.09	.03			.14	.08	.15			-.09	.08	-.10		
Step 2				.006	.006				.024	.006				.011	.002
Maternal Relationship History[b]	.01	.01	.09			.01	.01	.09			-.003	.01	-.05		
Step 3				.016	.010				.069*	.045*				.011	.000
Maternal Concepts of Development[c]	.04	.04	.10			.08	.03	.21*			.003	.03	.01		

Note. [a]Child temperament total difficulty scores at 12 months. [b]Parental Bonding Instrument scores at 24 months. [c]Maternal Concept of Development Questionnaire scores at 12 months.
* $p \leq .05$.

CHAPTER V

DISCUSSION

This study was undertaken with the proposition that, during the developmental transition from relative dependence in infancy to emerging autonomy in toddlerhood, quality of feeding interactions between caregiver and child contributes to the child's abilities to self-regulate feeding conducive to optimal growth and development within the child and environment's capacities. The purpose of this study was to further the understanding of feeding interaction quality over the course of this transition and to facilitate the development of an assessment tool for feeding interaction quality during toddlerhood that would have utility in both research and clinical practice. With this purpose in mind, the study focused on two major aims. These were exploration of the reliability and validity of the NCAFS beyond 12 months to 24 and 36 months and the assessment of potential contributions of selected maternal and child characteristics to feeding interaction quality.

Reliability of the NCAFS at 12, 24, and 36 months was explored through assessment of interrater reliability, internal consistency of the various subscales and the scale as a whole, and stability of the scale measurements over time. Convergent validity of the NCAFS over time was assessed via comparison with the Snack Scale, another measure of feeding interaction quality with established reliability and validity at 12, 24, and 36 months. Contributions of maternal relationship history of care and overprotection/control with their own parent, maternal beliefs related to child development, and child temperament were also examined to assess how they may contribute to variations in feeding interaction quality.

This chapter discusses the study's findings in relation to these two major aims and the how these findings relate to the existing body of knowledge. Proposals for modification of the NCAFS and an alternative measurement model are considered in light of the study's findings and what is known regarding child development during the transition period from infancy through toddlerhood. Implications for nursing, as well as limitations of the study and future research recommendations are also discussed.

Differences among Subjects on Demographic Variables

Ethnicity

The findings of significant differences between Caucasian and African-American subjects on the NCAFS in this study were unexpected. Ethnic differences between African-American and Caucasian subjects were not significant on caregiver, child, and caregiver-child total feeding interaction quality in the normative sample, although African-Americans did score consistently lower than Caucasian mothers (Sumner & Spietz, 1994a). In this study, caregiver and caregiver-child total scores differed significantly at each age, with African American mothers on average demonstrating fewer behaviors that contribute to increased dyadic feeding interaction quality than Caucasian mothers. African-American children significantly differed from Caucasian children only at 12 months. Thus, statistically significant lower levels of feeding interaction quality overall appeared to be driven primarily by maternal differences.

However, the importance of these differences is questionable, in part, due to sample size discrepancies between the two groups, with over four times as many Caucasian mothers as African-American mothers. Further, ethnicity was confounded with lower income, since African-American mothers as a group were of lower income than

their Caucasian counterparts. In addition, 75% of African-American mothers had not been educated beyond high school compared to 60% of Caucasian mothers. The relationships among ethnicity, income, and education contribute to difficulty in interpreting the significant differences between these two ethnic groups on interaction quality.

Another consideration is that both African-American and Caucasian groups of mothers, children, and dyads consistently had lower average mean scores than the normative sample. This may be due to the systematic absence of a number of behaviors among the dyads in this study. This absence of certain behaviors among all or a majority of the sample was due to developmental changes in children and adaptation by their caregivers during feeding interaction. For example, at 12 months of age and beyond, none of the caregivers positioned the child so that trunk-to-trunk contact was maintained during more than half of a breast or bottle feeding (item 3) because these children were no longer breast or bottle feeding. Therefore, behaviors that are salient at less than 12 months of age may be less salient or nonexistent for toddlers and their caregivers. Further, the context of the observation may have accounted for some of these systematically lower scores. For instance, at 12 and 24 months, relatively few mothers maintained the "en face" position for more than half the feeding (Item 29). This may have been due not only to adaptive change in light of development, but due to the way chairs were arranged in the room.

The clinical meaning of the differences between African-American and Caucasian mothers in this study is not clear. Recall that African-American dyads in the normative sample had lower average caregiver, child, and caregiver-child total scores than

Caucasian dyads (Sumner & Spietz, 1994a). The NCAFS has cutoff scores to identify dyads by ethnicity that may require additional assessment and potential intervention. Use of the Caucasian cutoff score is recommended for initial screening and identification in mixed-race and/or mixed ethnicity groups, but, for outcome evaluation, ethnicity specific cutoff scores are recommended (Sumner & Spietz, 1994a). Using the Caucasian cutoff scores for initial screening and identification at 12 months, African-American dyads on average would have fallen less than one point below the cutoff, though African-American mothers and children individually would not have fallen below mother or child cutoff scores. At 24 and 36 months, African-Americans were above the Caucasian cutoff for initial screening and identification. Caucasians were consistently above cutoff scores at each age. Despite the consistently lower average scores among dyads in this study compared to the normative sample, the average scores among African-American and Caucasian mothers did not fall below the ethnicity specific cutoff scores of the NCAFS. This provides further evidence that this sample was a relatively low risk sample in regard to feeding interaction problems.

Despite some ambiguity due to sample size discrepancies and the relationships among ethnicity, income, and education, the interaction quality differences between African-American and Caucasian dyads in this study suggest that ethnicity deserves attention in future studies. This is particularly true in regard to studies leading toward intervention. It is recommended that attempts be made to recruit larger numbers of African-Americans representing the full range of income and education levels. Another strategy would be to match subjects from specified ethnic groups with Caucasians on

income and education levels to assess differences between groups in relation to both the NCAFS and the Snack Scale.

Maternal Education

The findings of differences among maternal education levels on child total scores at 12 and 36 months and on caregiver-child total scores at 36 months pointed to mothers with higher education having children with more positive interaction behavior at 12 and 36 months and higher quality dyadic interaction at 36 months. The meaning of these findings is difficult to ascertain. In one NCAFS normative sample, education was confounded with age: differences among adolescent mothers 13-18 years old, mothers 19-25 years old with less than 12 years of education (low education), and mothers 19-25 years old with 12 or more years of education (high education), were significant only between adolescents and mothers with high education for child total scores (Sumner & Spietz, 1994a). For caregiver-child total scores, there were significant differences between adolescent and high education mothers and between low education and high education mothers (Sumner & Spietz, 1994a). Due to differences in education categories, maternal age ranges, and child age ranges, comparisons between this normative sample and this study's sample are difficult to interpret. One would not necessarily expect similar differences among this study's sample. Given that the significant differences among maternal education levels occurred in only a few isolated instances, a decision was made not to control for maternal education level in subsequent analyses. It is possible that due to the significant positive correlation between maternal education level and maternal concepts of development, the prediction of feeding interaction quality accounted for by maternal concepts of development may, in part, be accounted for by maternal education

level. However, from the standpoint of intervention, while both educational levels and concepts of development may be subject to change, maternal education levels are likely not to be as immediately modifiable as maternal concepts of development.

Reliability of the NCAFS over Time

Interrater Reliability

As discussed in the Methods section, the agreement between the two raters in this study was generally quite good. The average percentage of agreement was over 90% at all time periods. Given that the raters were trained to accuracy and reliability in coding at levels of 90% or higher agreement with NCAFS standardized testing, the average percentage of agreement between raters in this study suggests that the NCAFS behavioral checklist was being used as it was intended. Further, the scores should accurately reflect interaction qualities as measured by the NCAFS if other trained raters were to score these dyads. However, percentage agreement alone does not take into account the possibility of chance agreement. Therefore, interrater agreement was also assessed through the calculation of Cohen's kappa at the NCAFS subscale level at 12, 24, and 36 months.

The agreement between the raters correcting for chance agreement generally ranged from good to excellent according to criteria set forth by Fleiss, Levin, and Park (2003). The median overall NCAFS kappa statistics improved over time. This most likely reflects the increasing ease in observation of presence or absence of interactive behaviors in both mother and child. This increasing ease may have arisen from several sources.

First, given the children's increasing capacity for fine and gross motor control and locomotion, caregivers were no longer as responsible for positioning and actively feeding the child at 24 and 36 months. These toddlers were most often seen positioning

themselves in their chairs and the majority actively explored the various snacks available to them, engaging in self-feeding with help from mothers in the opening and closing of containers and holding cups when necessary. These toddlers were also able to stand, turn, and walk away from or toward caregivers, increasing the clarity of engagement and disengagement cues. Perhaps the most striking contribution to the growing ease of coding presence or absence of behaviors seems to have been due to the children's increasing developmental sophistication in communication through language to express desires, needs, and distress. As noted in the review of literature, between 18 and 36 months, one would expect to see more verbal communication used in feeding interactions and children verbally asserting their desires to feed themselves. This was certainly the case among the children in this sample. The addition of increasingly intelligible discussion between mother and child in addition to an increasing clarity of the child's behavioral engagement and disengagement cues further clarified the presence or absence of maternal and child interactive behaviors for the raters.

Among the dyads in which interrater agreement and reliability were assessed, caregiver-child total scores were positively correlated between the two raters at 12, 24, and 36 months. Furthermore, there were no significant differences between these scores at any of the observation periods. Thus, in terms of assessment of overall dyadic feeding quality, the raters consistently rated similar scores over time.

Internal Consistency

Internal consistency of the NCAFS at 12, 24, and 36 months was low in comparison to conventional limits, which range from .50 to .80 depending upon which authority one chooses to cite. However, Pedhazur and Schmelkin (1991) contend that

reference to 'authoritative' sources is not as important as the researcher's determination of the level of error that is tolerable in light of the study's purpose. This issue deserves further exploration.

The KR-20 reliability statistic is the appropriate choice for dichotomous data. However, Pedhazur and Schmelkin (1991) point out that its underlying assumption is of parallelism of items, meaning that the true scores for all items are equal as are all of the errors; this is rarely found to be true in reality. Dichotomous items are also likely to have lower reliability compared to items with more categories or distinctions by virtue of their relative lack of variability (Pedhazur & Schmelkin, 1991).

The NCAFS caregiver, child, and caregiver-child total scores generally had higher internal consistency at each observation than the subscales. This, in part, may be due simply to the larger number of items in these subscales. This is also in keeping with the principle of aggregation, in which the aggregate of a set of items has greater stability and less bias than any single item in the set (Rushton, Brainerd, & Pressley, 1983). The NCAFS is constructed in this way, with total scores reflecting overall feeding interaction quality. As noted earlier, the multiple subscales of the NCAFS allow it to address the multidimensionality of this quality of interaction. Sumner and Spietz (1994a) echoed this in their discussion of the high alpha estimate for the caregiver-child total score compared to the lower alpha statistics for the subscales. They suggested that this total score is more reliable for group comparison than the subscale scores.

The internal consistency reliability estimates in this study were considerably lower than those reported in the NCAFS manual (Sumner & Spietz, 1994a). A plausible explanation for this lies in the lower levels of variability in this sample compared to the

sample in the NCAST database. It is not clear how the Cronbach's alphas for the NCAFS reported in the manual were calculated. The manual does report, however, that the entire database at the time of publication contained 1914 feeding cases. These cases contained caregivers with diverse age, ethnicity, education, and socio-economic backgrounds with children ranging from 1-12 months of age.

Recall that the period from 1-12 months of age is marked by several developmental stages of adaptation in caregiver-infant interaction (Sander, 1975). Thus, one would expect a greater degree of variability in presence or absence of behaviors measured by the NCAFS over one year than one would expect within a single period of observation, such as 12, 24, or 36 months. For example, one would typically expect greater variability between a 1-month old and 9-month old than between two 12-month olds. The same would likely be true of variability between a mother interacting with a 1-month old and a mother interacting with a 9-month old compared to the variability between two mothers interacting with their two 12-month old children. While potential differences based on a multitude of factors are acknowledged, the similarity of the developmental adaptational tasks and the child's capacities should be less variable between dyads with children of the same age. In order to assess this proposition, a future analysis of this data set will include random selection of equal thirds of dyads from the 12, 24, and 36 month observations. These thirds from each age group will be combined to create one group of 116 dyads, which will be reassessed for internal consistency.

Recall that roughly one third of the total items in the NCAFS were dropped from assessment of internal consistency due to zero variance. In addition, a large number of items had very little variance. Thus, one would expect the reliability coefficients of the

NCAFS in this study to be lower due to a decrease in the ratio of true variance to error variance (Streiner & Norman, 1995). The NCAFS was designed to assess feeding interaction quality for infants up to 12 months of age. As discussed earlier, the significant number of items with little or no variance in this study could be explained by the developmental capacities of older children and caregiver-child adaptations. For example, item 65 states "child has less than three rapid state changes during the feeding" (Sumner & Spietz, 1994a). While this item may differentiate the younger infant who may have less state stability, older children without developmental delays are much less likely to demonstrate such lability in states of sleep and consciousness. Item 2, which states "caregiver positions child so that the child's head is higher than the hips" (Sumner & Spietz, 1994a) is no longer as salient for older children because they have greater strength and motor skills and can position themselves. However, at least one of the items may have had little or no variance due to the characteristics of the observational setting. Item 28, "Caregiver pays more attention to the child during the feeding than to other people or things in the environment" (Sumner & Spietz, 1994a) was endorsed as present most of the time. This finding may not have been as consistent across the sample had the observation taken place in the home with other family members and tasks competing for the mother's attention.

Attrition of items led to a decreased number of items effectively differentiating the dyads. It is important to note that the internal consistency of the caregiver, child, and caregiver-child total scores improved at each observation period once items with correlations lower than .10 were dropped from the calculation of internal consistency. This does not mean that the NCAFS need be discarded as a measure of feeding

interaction quality for dyads with older children. It does suggest, however, that the NCAFS will require modification in order to be a more internally consistent measure of feeding interaction quality.

Streiner and Norman (1995) have suggested that one way to enhance the true variance would be to add items that would lead to average scores nearer the middle range of possible scores. Recommendations about potential additions or revisions to the NCAFS for older age children include items or new item descriptions that would reflect whether adaptational tasks are being met by the dyad. For example, whereas the current version has the caregiver achieving higher scores through actively positioning and actively feeding the child, new items might maintain the importance of positioning and feeding, but have wording that reflects the caregiver's adaptive role of providing structured, safe, and appropriate meal contexts and foods that allow for the child's increasingly sophisticated motor and cognitive skills in relation to eating.

Items related to social-emotional and cognitive growth fostering by caregivers would also need to reflect the older child's capacities and needs for stimulation that are different from those of the younger infant. Item wording may not necessarily need to be changed, but item description for raters would need to reflect expected developmental capacities and needs of older children and ways that caregivers accommodate these. Theoretically, items for both child and caregiver might also be chosen to reflect the adaptive issues of self-assertion between 14 and 20 months and recognition and continuity between 18 and 36 months (Sander, 1975).

One measurement model that may be useful in the development of a revised version of the NCAFS for children 12 months old and older is Rasch modeling. Rasch

modeling aims to assist in the construction of objective measures of human attributes (in this case, feeding interaction quality) that are independent of the abilities of those they are measuring (Bond & Fox, 2001). Bond and Fox (2001) propose that it is only after such objective measures have been calibrated that "inferences regarding underlying constructs, rather than descriptions of superficial raw data" (p. 3) can be made. Rasch modeling is based on the principle that along a unidimensional continuum (again, in this case, feeding interaction quality), some dyads will demonstrate less of the attribute and some will demonstrate more (Bond & Fox, 2001). Further, it allows for assessment of both person ability and item difficulty (Bond & Fox, 2001). One question that has emerged in regard to the NCAFS is whether comparatively higher feeding interaction quality will manifest through presence of the same behaviors across different groups. In its current form, for example, two mothers may achieve the same score on Sensitivity to Cues, say eight out of sixteen possible, while demonstrating the presence of completely different behaviors. Rasch modeling may help in identifying patterns of item response difficulty or endorsement as well as individuals or dyads which do not follow the pattern and may need further study. Rasch modeling will, therefore, be considered in future evaluation of this study's data.

Stability of the NCAFS over Time

Stability of the NCAFS caregiver, child, and caregiver-child total scores was assessed through correlation between scores at 12 and 24 months, 24 and 36 months, and 12 and 36 months. Caregiver scores were noteworthy for significant correlation at each time period, although the correlations were small to moderate. This suggests that overall maternal contributions to dyadic feeding quality demonstrated relative stability over the

1- and 2-year intervals in this study. Child and caregiver-child total scores, however, were significantly correlated only between 12 and 36 months. Interpretation of these data is somewhat problematic. There appeared to be less stability in the child scores at 24 months and this impacted the stability of the caregiver-child total scores, as well. One of the central issues is whether one would expect stability of child scores over time. Given the current form of the NCAFS, some items might be endorsed as present more frequently in older children whereas others might more frequently be endorsed as absent, reflecting the developmental capacities of the child. Thus, one may see a change in the pattern of endorsement of items as the child ages, but not necessarily in the overall score. The importance or confidence one can place in the finding of a significant correlation between 12- and 36-month scores for both child and caregiver-child total scores is unclear and requires further investigation given that test-retest correlations may be influenced by the reliability of measures, true changes in individuals, or some combination of the two (Pedhazur and Schmelkin, 1991) . However, the adaptational tasks of 'self-assertion' (14-20 months), 'recognition' (18-36 months), and 'continuity' (18-36 months) (Sander, 1975), which may disrupt previously harmonious interactions between caregiver and child, and the expectation that successful negotiation of these tasks by around 36 months allows for sensitive coordination of interactions provide a theoretical explanation for these findings.

Convergent Validity between the NCAFS and the Snack Scale

12 Months

Dyadic Classifications

Significant differences were found among the Snack Scale mutuality classifications on the NCAFS subscales at 12 months. Patterns were as one would expect theoretically, with connected dyads having the highest levels of maternal and child behaviors deemed important to feeding interaction quality on the NCAFS. Connected dyads are those in which agendas are shared, negotiated, and followed and interactions are balanced (Houck & Spegman, 1999). Marginally connected dyads followed connected dyads in levels of maternal and child behaviors on the NCAFS. This was expected given marginally connected dyads' characteristics of moderate levels of cooperation and less negotiation of agendas than connected dyads, and an imbalance in responsiveness, with one partner initiating or following the majority of interactions (Houck & Spegman, 1999). Poorly connected dyads consistently had the lowest levels of behaviors that contribute to feeding interaction quality as measured by the NCAFS. Recall that dyads poor in mutuality demonstrate little awareness of the partner's agenda, with minimal negotiation, shared goals or emotional/social connectedness (Houck & Spegman, 1999). This suggests that the NCAFS and the Snack Scale converge in theoretically expected ways in regard to feeding interaction quality at 12 months.

The most salient behavioral subscales in regard to differentiation of the Snack Scale mutuality classifications were responsiveness to caregiver and social-emotional and cognitive growth fostering. This suggests that at 12 months, the levels of maternal sensitivity to cues, maternal responsiveness, and child clarity of cues as measured by the

NCAFS were relatively equivalent among connected, marginally connected, and poorly connected dyads. It appears that at 12 months the behaviors that comprise these subscales are not as important in differentiating quality of initial interaction in feeding as measured by the Snack Scale. This is not to say that they may not be of importance later in the course of the feeding.

Further analyses found consistently significant differences between connected and poorly connected dyads. Mothers in marginally connected dyads also had significantly higher levels of social emotional growth fostering than poorly connected dyads. However, NCAFS scores did not differentiate connected and marginally connected dyads. This same pattern was seen in differences among the Snack Scale mutuality classifications on overall feeding interaction quality as measured by the NCAFS. At 12 months, the NCAFS distinguishes between those who are poorly connected and those who are not, but it does not capture differences between connected and marginally connected dyads.

Maternal Classifications

Significant differences were found among the Snack Scale maternal classifications (Houck & Spegman, 1999) on the NCAFS maternal subscales at each age. At 12 months, the consistent pattern that emerged was for mothers in the two engaged classifications to display higher levels of sensitivity to cues, responsiveness to child distress, and social-emotional and cognitive growth fostering than mothers assigned one of the two disengaged classifications. Except in sensitivity to cues, facilitative engaged mothers demonstrated the highest levels of these behaviors. This was expected given facilitative engaged mothers maintain a relatively equal balance of behaviors either

facilitating the child or assisting the child in gaining self-understanding. Both engaged maternal classifications include maternal awareness of the child's agenda and clues, though controlling engaged mothers tend to engage in ways that maintain the mother's agenda rather than that of the child. The disengaged classifications are remarkable for their sense of disconnection from the child's agenda. It was unexpected for controlling engaged mothers to have higher mean sensitivity to cues than facilitative engaged mothers, however upon further examination, the mean levels of sensitivity between the engaged classifications were nearly the same and statistically indistinguishable in post hoc analysis. The same was true in regard to controlling disengaged mothers demonstrating higher levels of responsiveness to distress than facilitative disengaged mothers. In general, the pattern in relation to engagement versus disengagement was for facilitative mothers to display higher levels of subscale behaviors than controlling mothers. Overall, these results suggest that at 12 months the NCAFS and the Snack Scale converged in more or less expected ways in regard to maternal contributions to initial feeding interaction quality.

The most salient maternal behavioral categories in regard to differentiation of the Snack Scale classifications were social-emotional and cognitive growth fostering. Further analysis found significant differences between facilitative engaged and controlling disengaged mothers in both types of growth fostering, with facilitative engaged mothers employing higher levels of both types of growth fostering that controlling disengaged mothers. Controlling engaged mothers were also found to use more levels of cognitive growth fostering than controlling disengaged mothers. The lack of significant differences between other classifications in regard to growth fostering behaviors and among any of

the Snack Scale maternal classifications for sensitivity to cues and responsiveness to distress suggests that the Snack Scale may be capable of finer distinctions among mothers than the NCAFS in relation to sensitive responsiveness and control (as defined by the Snack Scale). However, the Snack Scale assesses the first three minutes of a feeding interaction whereas the NCAFS assesses feeding from initiation through termination. This may account for some of the findings here. For example, presence or absence of several behaviors that represent sensitivity to the child's cues in the NCAFS cannot be determined until the feeding has ended.

There were also significant differences among maternal classifications on maternal overall contributions to feeding interaction quality. Both types of engaged mothers showed significantly higher overall feeding interaction quality than controlling disengaged mothers. Facilitative engaged mothers also showed significantly higher overall feeding interaction quality than facilitative disengaged mothers. There were, however, no significant differences among any of the other classification comparisons. These results suggest that at 12 months, the NCAFS overall maternal scores reflect engagement versus disengagement in maternal contributions to initial feeding interaction quality.

Child Classifications

Significant differences among Snack Scale child classifications on NCAFS child subscales were found only at 12 months. At 12 months, the pattern of means for each subscale was in theoretically expected directions, suggesting convergence between the NCAFS and Snack Scale in regard to child contributions to initial feeding interaction quality. Responsiveness to caregiver was the salient behavioral category differentiating

the classifications. Engaged assertive children, as expected, had significantly higher levels of responsiveness to their mothers that compliant disengaged children. There were no significant differences in comparisons between the other child classifications. Recall, however, that there were relatively small numbers of active disengaged children at 12 months. This small number may account for some of the inability to detect significant differences between active disengaged children and other classifications. This suggests that the NCAFS captured differences between children who maintained ongoing connectedness with their mothers and children with little self assertion who seemed disconnected in initial feeding interactions. The lack of differentiation among the child classifications by clarity of cues suggests relative equivalence among levels of clarity of cues during the initial negotiation of feeding.

Overall child contributions to feeding quality as measured by the NCAFS significantly differentiated the Snack Scale child classifications at 12. The only significant differences arose from higher overall child feeding quality among engaged assertive children compared to compliant disengaged children. Thus, at 12 months, the NCAFS appears to distinguish between connected, engaged children and compliant disengaged children.

24 Months

Dyadic Classifications

At 24 months, theoretically expected patterns of Snack Scale mutuality classifications on NCAFS subscales were maintained only for social emotional growth fostering and responsiveness to caregiver. This demonstrated a departure from the greater degree of convergence between the NCAFS and the Snack Scale seen at 12 months. The

most important NCAFS behavioral subscales differentiating Snack Scale mutuality classifications were maternal sensitivity to child cues and social emotional growth fostering. The patterns for social emotional growth fostering remained the same as at 12 months. Thus, maternal levels of social emotional growth fostering remained important indicators of mutuality in initial feeding interaction quality with clear distinctions between those poor in mutuality and at least marginally connected, but no clear distinction between those considered connected or marginally connected.

Mothers in connected dyads demonstrated significantly higher levels of sensitivity than mothers in marginally connected dyads, but there were no significant differences between connected and poorly connected mothers or poorly connected and marginally connected mothers. Theoretically this should not have been the case given the definitions of the mutuality classifications and underscores a departure from convergence between the two scales. The importance of child behaviors in differentiating mutuality among dyads disappeared at 24 months. This may be due to the lower capacity of child behavioral items on the NCAFS to differentiate toddlers at 24 months. The only significant difference among mutuality classifications on overall feeding interaction quality was between connected and poorly connected dyads. Those dyads considered marginal in mutuality were not identified as a separate group by the NCAFS.

Maternal Classifications

At 24 months, engaged mothers still demonstrated higher levels of sensitivity to cues and cognitive growth fostering than disengaged mothers, but maternal facilitation versus control appeared to become the salient dimension in relation to response to the child's distress and social emotional growth fostering. Facilitative engaged mothers are

characterized by their facilitation of the child versus controlling behaviors, although facilitative disengaged mothers require more overt cues from the child than engaged mothers due to their relative lack of attention and interest in the child's agenda (Houck & Spegman, 1999). This shift of salience to facilitation versus control rather than engagement versus disengagement in response to distress and social emotional growth fostering may represent the importance of maternal adaptations in these areas to the emerging capacity in the child for communication of emotions, desires, and intentions, as well as increasing autonomy in self-feeding. However, this is speculative given the lack of significant differences among classifications in response to distress.

The most important maternal behavioral category for differentiation of the Snack Scale maternal classifications at 24 months was social emotional growth fostering. As at 12 months, facilitative engaged mothers showed significantly higher levels of social emotional growth fostering than controlling disengaged mothers. Also, as at 12 months, both types of engaged mothers had significantly higher overall contributions to feeding interaction quality than controlling disengaged mothers. At 24 months, the overall maternal contributions to initial feeding quality as measured by NCAFS again reflect qualities of engagement versus disengagement.

Child Classifications

As discussed earlier, the lack of significant differences among child classifications on NCAFS child subscales or child overall contributions may be due to a decreased capacity of child items appropriate at 12 months to adequately differentiate older toddlers at 24 months. In addition, the pattern of means changed in theoretically

unexpected ways, suggesting a departure from convergence between the NCAFS and Snack Scale for the child.

36 Months

Dyadic Classifications

At 36 months, Snack Scale mutuality classifications were again significantly differentiated by the combination of NCAFS subscales and the pattern of means returned to the expected direction, mirroring the pattern observed at 12 months. This suggests that the period of 24 months may represent a time of transition that leads to less stability in the overall quality of dyadic interaction during feeding. As discussed above in regard to stability of interactive quality, the consequences of successful negotiation of dyadic adaptational tasks in early childhood may account for these findings.

As at 12 months, maternal cognitive growth fostering and child responsiveness to caregiver were salient subscales in the differentiation of Snack Scale mutuality classifications. Connected and marginally connected dyads both contained mothers who demonstrated higher levels of cognitive growth fostering than mothers in poorly connected dyads, but the connected and marginally connected dyads were statistically indistinguishable. Connected dyads contained children who demonstrated significantly higher levels of responsiveness to their mothers than children in poorly connected dyads, but, as at 12 months, there were no significant distinctions between connected and marginally connected dyads or marginally connected and poorly connected dyads in regard to child responsiveness to their mothers.

As at 24 months, maternal sensitivity to cues was an important subscale for differentiating mutuality classifications but, at 36 months, as with cognitive growth

fostering, connected and marginally connected dyads contained mothers who were significantly more sensitive to their children's cues than mothers in poorly connected dyads. Yet, mothers in connected and marginally connected dyads were statistically indistinguishable from one another in regard to their levels of sensitivity. The pattern of means for social emotional growth fostering remained the same as at 12 and 24 months. This underscores the salience of social emotional growth fostering during toddlerhood. Significant differences among mutuality classifications in regard to overall feeding interaction quality as measured by the NCAFS were the same as those seen at 12 months, suggesting that, again, the NCAFS distinguished between those poor and at least marginally connected in mutuality.

Maternal Classifications

At 36 months, engaged mothers still demonstrated higher levels of sensitivity to cues than disengaged mothers. In fact, the pattern was the same as at 24 months. Engagement versus disengagement once again became important in regard to response to child distress as it had been at 12 months. However, in contrast to 12 months, controlling disengaged mothers demonstrated the lowest levels of response to distress. It was not unexpected that controlling disengaged mothers would have the lowest levels of response to distress. However, it is unclear why engagement versus disengagement once again appeared to become more salient in regard to response to distress. One could speculate that this may be due to some change in the ways that 3 year-olds express distress during feeding, but this is uncertain.

The pattern for social emotional growth fostering remained the same as it had been at 24 months. For the first time, cognitive growth fostering appeared to drive

differentiation in regard to facilitation rather than engagement. Perhaps this represents another important area for maternal adaptation to the child's increasing cognitive sophistication and needs.

As at 12 months, the most salient behaviors differentiating Snack Scale classifications were social-emotional and cognitive growth fostering. Facilitative engaged mothers showed significantly higher levels of both types of growth fostering than controlling disengaged mothers. At this age, facilitative disengaged mothers had the same relationship as facilitative engaged mothers when compared to controlling disengaged mothers. As at 12 months and 24 months, both types of engaged mothers had significantly higher overall contributions to feeding interaction quality than controlling disengaged mothers. At 36 months, overall maternal contributions to initial feeding quality again reflected engagement versus disengagement, but only in regard to controlling disengagement. Facilitative disengaged mothers were also significantly higher than controlling disengaged mothers. Thus, at 36 months, the NCAFS distinguished between controlling disengaged and the other classifications, highlighting the negative impact of this classification on maternal contributions to feeding interaction quality.

Child Classifications

As at 24 months, there was a lack of differentiation among child classifications on NCAFS child subscales. Again, this may be due to a decreased capacity for differentiation among the child items for older toddlers. The finding of a significant difference between engaged assertive children and compliant disengaged children in overall child contributions to initial feeding interaction quality underscores the importance of child engagement in these child contributions to interaction quality.

Summary

Across dyadic, maternal, and child assessments, the Snack Scale differentiated dyads and individuals in ways that the NCAFS could not capture. Recall that one of the dimensions of relationship suggested by Hinde (1976) regards qualities of component interactions. Attention to synchronization of the goals of one partner with the ongoing goals of another is considered particularly important (Hinde, 1976). According to Hinde (1976), some judgments about the quality of this synchronization depend upon patterning of interactions, which includes the relative and absolute frequency of partners' behaviors in relation to one another (Hinde, 1976).

As noted earlier, the binary format of the NCAFS limits its ability to attend to issues of frequency and, subsequently, patterning. The Snack Scale mutuality classifications, on the other hand, were specifically designed to capture qualities of feeding interaction. Both relative and absolute frequencies of behaviors influence the ratings used to differentially classify the patterns of interaction as connected, marginal, or poor in mutuality. This difference in the scales could certainly account for the inability of the NCAFS to differentiate connected and marginally connected dyads. The Snack Scale also attends to relative and absolute frequencies of behaviors in classifying mothers and children. As with mutuality, this may account for the inability of the NCAFS to differentiate mothers and children at as fine a level as the Snack Scale. The clinical meaning of this finer level of distinction by the Snack Scale is unknown since it has not been used in studies of dyads with known feeding problems.

In addition, recall that the NCAFS had attrition of approximately one-third of its items due to zero variance at each age and a majority of its items had very little variance.

This effectively decreased the NCAFS ability to distinguish between subjects. Remember that the NCAFS was constructed to assess feeding quality in dyads with infants up to 12 months of age. In light of this, it is interesting to note that the NCAFS and the Snack Scale demonstrated the greatest convergent validity at 12 months.

Maternal and Child Contributions to Feeding Interaction Quality

Child Temperament

In this study, difficult temperament was not found to be uniquely predictive of feeding interaction quality. This is in contrast to studies of failure to thrive, in which difficult temperament has been found to contribute to problematic feeding interactions (Chatoor et al., 2000; Hagekull et al., 1997; Lindberg et al., 1994). As noted earlier, one could also conjecture that temperamental difficulty may contribute to obesigenic feeding interactions, as well, through maternal misperceptions of her temperamentally difficult child's behaviors as expressions of hunger or lack of satiation. When data were collected for this study, the original investigator did not assess for failure to thrive or obesity at intake and no anthropometric measures were subsequently collected. Recall that the study did seek healthy children at intake, however, so this sample could be considered relatively normal with no known feeding problems.

Only at 24 months was difficult temperament found to be significantly correlated with overall feeding interaction quality as measured by NCAFS and this correlation was positive. This means that the more difficult a child's temperament, the higher the feeding interaction quality. Further analysis revealed that this could be attributed to the positive correlation between child responsiveness to their mothers and temperamental difficulty. It could be that the withdrawal from new situations, slow adaptation, and intense and

negative mood characteristic of children with difficult temperament led these children to respond to the feeding situation and their mothers and, in turn, for their mothers to respond to them in ways that are more readily captured by the behavioral items in this NCAFS subscale when compared to children with easy adaptation to new situations and mild and mostly positive mood. This may have been more clearly present at 24 months versus the earlier or later observation periods.

Maternal Early Relationship History

Maternal early relationship history was not found to uniquely predict overall feeding interaction quality or maternal or child contributions to this quality. As with difficult temperament, this was in contrast to findings in studies of failure to thrive, in which insecure or dismissive early relationship attachment was associated with problematic dyadic interaction (Chatoor et al., 2000; Coolbear & Benoit, 1999; Ward et al., 2000). Recall, however, that the sample in this study was considered healthy with no identified feeding problems. The finding of no unique predictive ability of maternal early relationship history in this study does not mean that it is not worthy of further consideration, but that in relatively normal dyads its unique influence may be lessened. Miller-Loncar et al. (1997) found that maternal early relationship history's influence on parenting behaviors was mediated by their concepts of development. These authors used structural equation modeling in their analysis; such an analysis may prove fruitful in future research with maternal early relationship history.

Maternal Concepts of Development

Maternal concepts of development were found to be unique contributors to the variance in maternal behavioral contributions to overall feeding quality as measured by

the NCAFS at 12, 24 and 36 months. This finding supports the findings of Miller-Loncar et al. (1997), in which more multi-causal concepts of development, which they called a child-centered perspective, assessed at 6 and 12 months of child age were predictive of greater maternal use of warm sensitivity in everyday interactions (including feeding) with their child at 24 months. Recall that because there were no significant differences between maternal concepts of development scores measured at 12, 24, and 36 months in this study, 12-month concepts of development scores were used in all subsequent analyses. Thus, in this study, maternal concepts of development at 12 months were predictive of overall maternal contributions to feeding interaction quality at 12, 24, and 36 months. They were also found to be unique contributors to overall dyadic feeding interaction quality and overall child behavioral contributions to feeding interaction quality at 24 months.

However, overall these unique contributions were relatively small. Maternal concepts of development were found to uniquely account for variance ranging from 4.7% to 5.1% in maternal behavioral contributions to feeding interaction quality. The median variance in the maternal contributions accounted for by maternal concepts of development was 4.9 percent. At 24 months, maternal concepts of development also accounted for 7.4% of the variance in overall feeding interaction quality and 4.5% of the variance in child contributions to feeding interaction quality.

At each age, a more multi-causal perspective of child development was associated with higher maternal contributions to overall feeding interaction quality and higher dyadic feeding interaction quality in general. At 12 months, further analysis revealed that this was attributable to significant positive correlations between maternal concepts of

development and maternal sensitivity to their child's cues, social-emotional growth fostering, and cognitive growth fostering. Thus, mothers with increasingly multi-causal perspectives of child development were associated with higher levels of engagement in sensitivity to their child and more behaviors promoting both social-emotional and cognitive growth. This also appeared to drive the association between more multi-causal concepts of development and increasing overall feeding interaction quality. It could be that, at 12 months of age, mothers who tend to believe that their child's development proceeds through transactions between the child's constitutional characteristics and environmental inputs are more likely to acknowledge, through increased sensitivity, the importance of what the child brings to the interaction while also engaging in more social-emotional and cognitive growth fostering behaviors due to beliefs that environmental input helps shape development in these areas.

At 24 months, mothers with an increasingly multi-causal perspective of child development were still associated with higher levels of social-emotional growth promotion, but the relationships between this multi-causal perspective and sensitivity to the child's engagement and disengagement cues and cognitive growth fostering were no longer present. This does not suggest that maternal sensitivity and cognitive growth fostering were not as important during this later age, but levels of maternal engagement in these types of behaviors were no longer associated with whether the mother had a more multi-causal concept of development. The reason for this is unclear. Perhaps due to increased child cognitive abilities, particularly in the use of intelligible language, and increased abilities of children to position themselves and engage in more self-feeding behaviors, maternal beliefs about child development were not as important compared to

12 months in determining maternal engagement in sensitive and cognitive growth fostering behaviors as defined by the NCAFS.

More multi-causal concepts of development were associated with higher levels of responsiveness to their child's distress at 24 months. This suggests that mothers with more multi-causal concepts of development may have viewed their child's distress behavior as stemming from factors within the child interacting with environmental factors. These mothers may engage in more positive responses to this distress than mothers who viewed the child's distress behaviors emerging purely from some characteristic of the child or environment.

In addition to the maternal associations with multi-causal developmental perspectives, children whose mothers had more multi-causal perspectives demonstrated higher levels of clarity in their cues to their mothers during feeding at 24 months. Reasons for this are uncertain. Perhaps mothers with more multi-causal developmental perspectives interact with their children in ways that allow the children to freely express both engagement and disengagement cues in a more supportive interactive context. The higher degrees of maternal social-emotional growth fostering and positive responsiveness to distress associated with more multi-causal perspectives would support this.

At 36 months, both mothers and dyads demonstrated higher quality of feeding interaction as maternal concepts of development became more multi-causal. This appeared to be driven by mothers with a more multi-causal perspective of child development demonstrating higher levels of maternal cognitive growth fostering. Perhaps this is due to an increased recognition of the importance of cognitive growth fostering for

these older toddlers among mothers with more multi-causal perspectives of child development.

Recall that maternal concepts of development scores were positively correlated with maternal level of education. Thus, more highly educated mothers tended to have more multi-causal perspectives of child development. This finding is not surprising given the increased likelihood that mothers would be exposed to a variety of ideas about child development as they become more highly educated. Regardless of a mother's level of education, however, her concepts of development may be open to modification given the opportunity for exposure to multi-causal perspectives. This potential modifiability is promising given the findings of an increased overall quality of interaction associated with more multi-causal perspectives. However, given the questions regarding the internal consistency of the NCAFS, these results and their potential implications must be tempered with caution.

Limitations

Analysis of Existent Data

This study drew from and existing data set that was collected from 1993-1997, as part of a larger investigation that assessed mother-child control-salient interactions at 12, 24, and 36 months (Houck, 1999). The quality of feeding interaction was assessed as one of four mother-toddler interactions that were the focus of this larger study. Thus, the original study did not include the measurement of variables that may have been of interest in relation to the current study, such as anthropometric measures and feeding histories. The observational data in the current study consisted of videotaped feeding interactions. Due to the relatively fixed position of the camera, there is the potential for

some facial expressions or other more subtle interactive behaviors to have been missed, particularly as older toddlers became more mobile. However, the high chair, chairs, and table were positioned in such a way that the majority, if not all, of the physical interactive behaviors could be viewed. Furthermore, the interactive behaviors were viewed in context with the concurrent sound recording of verbal exchanges between mothers and their toddlers. Nonetheless, this remains a potential limitation of this observational study. Future observational research of feeding interactions may be enhanced through the use of multiple cameras.

The duration of the videotaped feeding observation was generally set at 10 minutes. For many dyads, this precluded observation of the natural termination of feeding that is included in the NCAFS as an item to be assessed. Consequently, some behaviors were scored as absent that may have been present had the feeding reached its natural terminus. This scoring bias likely contributed to some dyads, mothers, and children obtaining lower scores than they may have otherwise. In future feeding studies, it will be important to measure the feeding interaction from its natural onset to its natural termination, which would be determined by each individual dyad.

Observational Coding Bias

Observational coding bias represents another potential limitation to this study. The possibility of coders being influenced on a subsequent coding of dyads by having previously coded those same dyads was solved to some extent by dividing the dyadic videotapes and alternating the two groups by age for each coder. In this way, the same videotapes (dyads) would not be coded by the same observer at the next subsequent age. Each rater coded 201 video taped observations of mother-toddler feeding interactions. It

is probable that the coders improved in accuracy and reliability of their coding due to practice and experience. However, each observer was trained to a level of 90% accuracy in use of the NCATS measure prior to viewing any of the tapes assessed in this study, which would mitigate against the bias introduced by practice and experience.

Observer fatigue and loss of concentration during coding is always a concern when human beings are used as observers. However, efforts were made to limit the number of tapes viewed both weekly and daily in efforts to prevent observer fatigue. Nevertheless, this may be a source of bias.

It is possible that observer drift may have contributed to observer bias. However, whenever clarification of NCAFS behavioral definitions for toddlers and their mothers was required, the two coders conferred with one another. In addition, consultation was sought with the author of the NCAFS and experts that staff NCAST-AVENUW, at the University of Washington, in order to ensure reliable coding with the measure for older toddlers.

Both coders in this study were Caucasian, thereby introducing the potential for bias. Such bias may be limited by the use of measures that assess specific behaviors versus global impressions, require little inference, and demonstrate high interrater reliability among trained observers (Foster & Martinez, 1995). The NCAFS items consist of specific behaviors that require little inference, if any. In addition, interrater reliability in this study was generally quite good. Thus, while the possibility for ethnic or racial bias exists, steps were taken to minimize it.

Observational Method

Another potential limitation of the study may arise from reactivity of the mothers, children, or both to the observation context. Mothers and children may have interacted differently due to an awareness of being observed or the novelty of the observational setting in comparison to more familiar contexts, such as the home. While mothers knew they were being videotaped, children most often did not or did not express such knowledge verbally during observation. Videotaping through a one-way mirror minimized intrusiveness of the observation. In addition, the feeding interaction occurred after other mother-toddler activities in the room, thereby decreasing the effect of novelty of context. Nonetheless, bias due to observational method and context remain possible limitations.

The Toddler Temperament Scale

The possibility exists that the measurements of toddler temperament in this study do not accurately reflect the child's true temperament. Concerns about caregiver subjectivity bias in the assessment of temperament are often met, however, with questions of whom better than the child's primary caregiver to assess the child's temperament. The limitations of questionnaires are acknowledged in the temperament research community and calls have come forth for multi-method measurement approaches that combine questionnaires with observational methods (Rothbart & Hwang, 2002; Saudino, 2003). It is recommended that future research assess the potential contribution of toddler temperament to feeding interaction quality using such approaches.

The Parental Bonding Instrument

There is the possibility that PBI scores, rather than reflecting accurate maternal recollections of their first sixteen years of childhood, are distorted recollections based on relatively recent interactions with the mother's parents (Mackinnon et al., 1989). Alternatively, recollections of childhood may be selective, tending to be determined by the years of later childhood when children have a greater ability to store and access such memories. Therefore, the early relationship history may not be accurately captured by the PBI so that the influence of relationship history on maternal feeding interaction quality may not have been adequately assessed. Nonetheless, maternal early relationship history has been shown to be associated with parenting behaviors (Miller-Loncar et al., 1997) and is worthy of continued study in relation to feeding interaction quality.

The Concepts of Development Questionnaire

A limitation of the CODQ is that while it provides a general measure of parental concepts of development it does not specifically address parental concepts of developmental tasks of feeding or the development of food preferences in childhood. Future studies may include efforts to pilot test items whose aims would be to measure parental concepts of development in these areas.

Summary and Recommendations

This study was undertaken to further the understanding of feeding interaction quality during the transition from infant dependence to toddler independence in feeding. The underlying premise was that feeding interaction quality during this transition contributes to the child's abilities to self-regulate feeding in ways that either support optimal growth and development or potentially contribute to nutritional problems of early

childhood, such as failure to thrive or obesity. While such nutritional problems are acknowledged as responses to a combination of genetic, environmental, and interpersonal factors, feeding interaction during early childhood can be viewed as a medium in which the interplay of these factors shapes subsequent eating behaviors.

In order to facilitate better understanding of feeding interaction quality, one of the primary aims of this study was to examine the reliability of the Nursing Child Assessment of Feeding Scale (NCAFS) during toddlerhood in order to enhance its utility in measuring feeding interaction quality beyond its current limit of 12 months of child age. Reliability of the NCAFS at 12, 24, and 36 months was explored through assessment of interrater reliability, internal consistency of the various subscales and the scale as a whole, and stability of the scale measurements over time.

The interrater agreement and reliability for the NCAFS was generally quite good, implying that the NCAFS was being used in a consistent and reliable manner by the two coders in this study. The internal consistency of the NCAFS was low in comparison to conventional limits. This was likely due to relatively low levels of variance among the dyads within each age and the attrition of several behavior items due to zero variance. This may have been due to the decreased capacity of items appropriate for dyads with children 12 months old or younger to differentiate dyads that have adapted to the increasing developmental sophistication of toddlerhood. One way proposed to assess this proposition would be to reassess the internal consistency of the NCAFS with a sample consisting of a combination of randomly selected unique thirds from the 12-, 24-, and 36-month dyads. This is recommended for future analysis.

There are several approaches that could be considered for improvement of the internal consistency of the NCAFS during toddlerhood. The addition of items capable to more clearly capturing the frequency of certain behaviors in which frequency may be important may capture greater variability. Likert scaling of certain items may also achieve this.

Replacement of items with zero or little variance that may no longer be salient for older children or refinement of behavioral descriptions for current items in order to assess whether adaptational tasks are being met by dyads and thereby better capture differences in interaction quality may also boost internal consistency. It would be beneficial for this type of revision and refinement to be undertaken through consultation with nutritionists, developmentalists, observational measurement experts, and other health care researchers and clinicians with expertise in early childhood development and feeding.

One analysis model that may prove useful in guiding such revision and refinement is Rasch modeling. With its ability to assess both person ability and item difficulty it may be helpful in identification of patterns of item response difficulty or endorsement as well as individuals or dyads which deviate from the pattern and may require further assessment. Rasch modeling is, therefore, recommended in exploration of revision of the NCAFS.

The observational setting of the observation and its duration may have also limited the variability observed across dyads. It is recommended that future studies of feeding interaction quality consider observation in the home as well as the lab setting. Data collection encompassing the natural initiation and termination of feeding would be helpful.

The stability of the NCAFS over time was assessed by correlation between scores at 12 and 24 months, 24 and 36 months, and 12 and 36 months. Maternal contributions to feeding interaction quality remained relatively stable over time, but child and dyadic contributions did not. This appears to have been due to less stability of child scores at 24 months. Analysis of stability of interaction quality should be assessed in future studies with an instrument that is capable of capturing dyadic interaction quality in light of child development over time. A refined NCAFS may demonstrate such a capacity.

Convergent validity was assessed between the NCAFS and the Snack Scale. Convergence between the two scales was greatest at 12 months, least at 24 months, and improved moderately at 36 months. Given that the NCAFS was constructed to assess feeding interaction quality in dyads with infants 12 months of age, it is not surprising to see the greatest convergence between the two scales at this age. However, even at 12 months, convergence between the scales was fair at best, with the NCAFS often failing to distinguish dyads and dyadic partners at as fine a level of distinction as the Snack Scale. This may have been due, in part, to the format of these measures. The binary format of the NCAFS limits its ability to attend to behavioral frequency and patterning of interactions, whereas the Snack Scale can capture these characteristics. The attrition of items in the NCAFS at each age also likely hampered its ability to differentiate dyads and individuals.

A NCAFS revised for toddlerhood may have a greater capacity for differentiation. The clinical importance of the finer distinctions by the Snack Scale in comparison to the NCAFS is uncertain. Future research may seek to assess this through longitudinal

assessment of mixed sample of dyads with some children with feeding problems and some without feeding problems using the Snack Scale and a revised NCAFS.

The NCAFS also does not appear to capture control-autonomy balance in feeding interactions as well as the Snack Scale. Control-autonomy balance is thought to be important as dyads transition from the relative dependence of infancy to the independence of toddlerhood in relation to feeding. This quality may be better captured in the contingency subscales of the NCAFS. Future analysis of this would be beneficial along with investigation of ways that the NCAFS might be improved in capturing this balance between control and autonomy in feeding interaction.

Another aim of this study was to assess maternal and child contributions to feeding interaction quality over time. Unexpected findings in this study were significant differences in dyadic, maternal, and child quality of feeding interaction between African-Americans and Caucasians. Child interaction quality differed only at 12 months, but maternal and, subsequently, dyadic quality differed at each age. However, there were four times as many Caucasians as African-Americans, despite oversampling efforts in the original study. In addition, ethnicity was confounded with lower income, since African-American mothers tended to be of lower income than their Caucasian counterparts. Further, 75% of African-American mothers had not been educated beyond high school compared to 60% of Caucasian mothers. These findings likely limit the generalizability of this study's results to Caucasian dyads with social profiles similar to those among Caucasians in the study. It is recommended that future studies recruit larger numbers of African-Americans representing the full range of income and education levels or attempt

to match subjects from specified ethnic groups with Caucasians on income and education levels to assess differences between ethnic groups in relation to the NCAFS.

On a few occasions there were significant differences among child or dyad interaction quality due to maternal educational level, but the importance of this was unclear. It is recommended that future studies attempt to recruit subjects with more equal representation across the range of education levels to further assess the importance of maternal education for feeding interaction quality.

Child temperament was assessed for its potential contribution to feeding interaction quality. It was not found to be uniquely predictive at any age. It may be that by 12 months of age mothers have already made adjustments for their child's temperament when interacting during feeding. However, it is recommended that the potential contributions of temperament be assessed in future studies through multi-method measurements of temperament.

Maternal early relationship history with their own parents was also assessed for its potential contribution to feeding interaction quality with the idea that maternal early relationship history may provide a filter through which mothers perceive and respond to their child's needs during feeding. As with child temperament, it was not found to be uniquely predictive of feeding interaction quality at any age. However, prior research suggests that the association between maternal early relationship history and later parenting behaviors may be mediated by maternal concepts of child development (Miller-Loncar et al., 1997). It is recommended that future studies assess for such mediation.

Finally, maternal concepts of development were assessed for their potential contribution to feeding interaction quality over time. More multi-causal maternal

concepts of child development, in which mothers tend to believe that their child's development proceeds through transactions between the child's constitutional characteristics and environmental, were unique predictors of maternal feeding interaction quality at each age. More multi-causal maternal concepts of child development were also uniquely predictive of child and dyadic feeding interaction quality at 24 months. On all of these occasions the proportion of variance explained was relatively small, but may be important nonetheless. The results must be viewed with some caution, but suggest that it would be beneficial for maternal concepts of development to continue to be explored for their contribution to feeding interaction quality in future studies. Future studies may also include pilot items to assess the influence on concepts of development specific to developmental tasks of feeding and development of feeding preferences.

Implications for Nursing

While the results of this study suggest that there is much future work that remains to be done in the development of an instrument that captures feeding interaction quality during toddlerhood, there are some implications for nursing that are worthy of consideration in the present. The low internal consistency of the NCAFS at 12 months coupled with the attrition of roughly one-third of its items due to zero variance calls into question its reliability at 12 months. However, it is recognized that there were aspects to this study, such as observational setting and duration of observation, which may have systematically contributed to some of this decrease in variance. Nonetheless, further studies of the reliability and validity of the NCAFS among dyads with 12-month old children is suggested since it is used not only in research, but also in clinical settings as a screening tool for problems in feeding interaction quality.

The findings that maternal concepts of development uniquely account for some of the variance in maternal feeding interaction quality, though they must be viewed with some caution, suggest that nurses and other health care professionals may be able to improve maternal feeding interaction quality through education. Given that more multi-causal perspectives of child development were consistently associated with higher maternal education, it appears that maternal concepts of development may be modifiable. This may represent an important contribution to improving feeding interaction quality between mothers and their children as they negotiate the transition from infancy to toddlerhood.

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Appendix A

Nursing Child Assessment of Feeding Scale

NCAST
FEEDING SCALE
Birth to One Year Only

ation applies to parent only
r's Ethnic Heritage (See back page)
l/Partner Status ☐ Married ☐ Single

Person Observed ____ Age ____ Educ.
☐ Mother ☐ Father
☐ Other ____
Major Caregiver ☐ Yes ☐ No
Type of Feeding ☐ Breast ☐ Bottle ☐ Solid
Usual Feeding Time ☐ Yes ☐ No
Length of Time Feeding *(circle minutes)*
10 or Less 11-19 20-29 30 or more

Setting
☐ Home
☐ Clinic
☐ Other ____
Were Others Present?
☐ Yes
☐ No
If yes, specify ____

Child's Name ____
Child's Age *(in months)* ____
Child's Sex ____
Child's Birth Order *(circle)*
1 2 3 4 5 or More
Child's State at Beginning of Feeding *(circle)*
Quiet Sleep Active Sleep Drowsy
Quiet Alert Active Alert Crying

IVITY TO CUES

	YES	NO
egiver positions child so that child is safe but can move his/her arms .		
egiver positions child so that the child's head is higher than hips.		
egiver positions child so that trunk-to-trunk contact is maintained during e than half of the breast or bottle feeding (50%).		
egiver positions child so that eye-to-eye contact is possible.		
egiver's face is at least 7-8 inches or more from the child's face during ing except when kissing, caressing, hugging, or burping the child.		
egiver smiles, verbalizes, or makes eye contact with child when child is in -face-gaze position.		
egiver comments verbally on child's hunger cues prior to feeding.		
egiver comments verbally on child's satiation cues before terminating ing.		
giver varies the intensity of verbal stimulation during feeding.		
giver varies intensity of rocking or moving the child during the feeding.		
giver varies the intensity or form of touch during the feeding.		
giver allows pauses in feeding when the child shows potent disengage- cues or is in the pause phase of the suck-pause sequence of sucking.		
giver slows the pace of feeding or pauses when child shows subtle gagement cues.		
giver terminates the feeding when the child shows satiation cues or after methods have proved unsuccessful.		
iver allows child to suck and/or chew without interruption.		
iver only offers food when the child is attending.		
TOTAL YES ANSWERS		

SE TO CHILD'S DISTRESS

☐ No (Potent Disengagement Cues Observed)

iver stops or starts feeding.		
iver changes the child's position.		
iver makes positive or sympathetic verbalization.		
iver changes voice volume to softer or higher pitch.		
iver makes soothing non-verbal efforts.		
ver diverts child's attention by playing games, introducing toy, or making		
ver avoids making negative verbal responses.		
ver avoids making negative comments to home visitor about child.		
ver avoids yelling at child.		
ver avoids using abrupt movements or rough handling.		
ver avoids slapping, hitting, or spanking the child.		
TOTAL YES ANSWERS		

III. SOCIAL-EMOTIONAL GROWTH FOSTERING

	YES	NO
28. Caregiver pays more attention to child during feeding than to other people or things in the environment.		
29. Caregiver is in "en face" position for more than half of the feeding.		
30. Caregiver succeeds in making eye contact with child once during feeding.		
31. Caregiver's facial expression changes at least twice during feeding .		
32. Caregiver engages in social forms of interaction (plays games with child) at least once during the feeding.		
33. Caregiver uses positive statements in talking to child during the feeding.		
34. Caregiver praises child or some quality of the child's behavior during the feeding.		
35. Caregiver hums, croons, sings or changes the pitch of his/her voice during the feeding.		
36. Caregiver laughs or smiles during the feeding.		
37. Caregiver uses gentle forms of touching during the feeding.		
38. Caregiver smiles, verbalizes or touches child within five seconds of child smiling or vocalizing at caregiver.		
39. Caregiver avoids compressing lips, grimacing, or frowning when making eye contact with child.		
40. Caregiver avoids slapping, hitting, shaking, or grabbing the child or child's extremities during the feeding.		
41. Caregiver avoids making negative comments or uncomplimentary remarks to the child or home visitor about the child or child's behavior.		
TOTAL YES ANSWERS		

IV. COGNITIVE GROWTH FOSTERING

42. Caregiver provides child with objects, finger foods, toys, and/or utensils.		
43. Caregiver encourages and/or allows the child to explore the breast, bottle, food, cup, bowl, utensils, or the caregiver during feeding.		
44. Caregiver talks to the child using two words at least three times during the feeding.		
45. Caregiver verbally describes food or feeding situation to child during feeding.		
46. Caregiver talks to child about things other than food, eating, or things related to feeding.		
47. Caregiver uses statements that describe, ask questions or explains consequences of behavior, more than commands, in talking to child.		
48. Caregiver verbally responds to child's sound within five seconds after child has vocalized.		
49. Caregiver verbally responds to child's movement within five seconds of child's movement of arms, legs, hands, head, trunk.		
50. Caregiver avoids using baby talk.		
TOTAL YES ANSWERS		

ARITY OF CUES

	YES	NO
Child signals readiness to eat.		
Child displays a build-up of tension at the beginning of feeding.		
Child demonstrates a decrease in tension within a few minutes after feeding has begun.		
Child has periods of alertness during the feeding.		
Child displays at least two different emotions during the feeding.		
Child has periods of activity and inactivity during the feeding.		
Child's movements are smooth and coordinated during the feeding.		
Child's arm and leg movements are generally directed toward caregiver during feeding (not diffuse).		
Child initiates contact with caregiver's face or eyes at least once during feeding.		
Child vocalizes during feeding.		
Child smiles or laughs during feeding.		
Child averts gaze, looks down or turns away during feeding.		
Child actively resists food offered.		
Child demonstrates satiation at end of feeding.		
Child has less than three rapid state changes during feeding.		
TOTAL YES ANSWERS		

SPONSIVENESS TO CAREGIVER

Child responds to feeding attempts by caregiver most of the time.		
Child responds to games, social play or social cues of caregiver during feeding.		
Child looks in the direction of the caregiver's face after caregiver has attempted to alert the child verbally or non-verbally during feeding.		
Child vocalizes to caregiver during feeding.		
Child vocalizes or smiles within five seconds of caregiver's vocalization.		
Child smiles at caregiver during feeding.		
Child explores caregiver or reaches out to touch caregiver during feeding.		
Child shows a change in level of motor activity within five seconds of being handled or repositioned by caregiver.		
Child shows potent disengagement cues during last half of feeding.		
Child shows potent disengagement cues within five seconds after caregiver moves closer than 7 to 8 inches from child's face.		
Child avoids turning away from caregiver, or averting gaze during first half of feeding.		
TOTAL YES ANSWERS		

this scale for research or clinical practice requires training. For more ation write or call:

NCAST Programs
University of Washington
Box 357920
Seattle, WA 98195-7920
Phone (206) 543-8528 FAX (206) 685-3284

Enter the total yes answers from each subscale and compare it with the possible score:

	SUBSCALE Items		CONTINGENCY Items	
	Possible	Actual	Possible	Actual
SENSITIVITY TO CUES	16		6	
RESPONSE TO DISTRESS	11		6	
SOCIAL-EMOTIONAL GROWTH FOSTERING	14		1	
COGNITIVE GROWTH FOSTERING	9		2	
CAREGIVER TOTAL	50		15	
CLARITY OF CUES	15		0	
RESPONSIVENESS TO CAREGIVER	11		3	
INFANT TOTAL	26		3	
CAREGIVER/INFANT TOTAL	76		18	

Check the Potent Disengagement Cues (PDC's) observed during the feeding interaction (excluding initial tension up to a minute into the feeding and any PDC's that terminate the feeding).

- ___ Back arching
- ___ Choking
- ___ Coughing
- ___ Crawling away
- ___ Cry face
- ___ Crying
- ___ Fussing
- ___ Halt hand
- ___ Lateral head shake
- ___ Maximal lateral gaze aversion
- ___ Overhand beating movements
- ___ Pale/red skin
- ___ Pulling away
- ___ Pushing away
- ___ Saying "no"
- ___ Spitting
- ___ Spitting up
- ___ Tray pound
- ___ Vomiting
- ___ Walking Away
- ___ Whining
- ___ Withdraw from alert to sleep state

Ethnic Heritage. Place a checkmark next to the mother's ethnic heritage and write in her specific group identity.

- ___ African-American
- ___ Asian Indian or A.I.- American
- ___ Chinese or Chinese-American
- ___ Filipino or Filipino-American
- ___ Japanese or Japanese-American
- ___ Korean or Korean-American
- ___ Pacific Islander or P.I.- American
- ___ Vietnamese or Vietnamese-American
- ___ Other Asian
- ___ Cuban or Cuban-American
- ___ Mexican, Chicano, or Mex. American
- ___ Puerto Rican
- ___ Other Hispanic/Latin
- ___ Native American or Alaskan Native
- ___ White/Caucasian (non-Hispanic)
- ___ Other

Specific group identity:_____

Clinical Notes:

Date of Observation_____

Recorder's Signature_____

Appendix B

Snack Scale and Coding Manual

SNACK CODING MANUAL

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January, 1999

This coding scheme was developed to assess the pattern of maternal and child interaction during a snack situation. The coding system was designed to classify mothers on the basis of their engagement and control during the snack interaction, and to classify children according to their engagement and autonomy. The coding scheme was intended to tap the quality of these dimensions as they were manifested in 2 components of a snack setting:

1) the verbal interaction and the extent to which the child was engaging with maternal connectedness and their enjoyment in the social process of conversing and

2) the negotiation of feeding/eating the snack and the extent to which the mother facilitated (vs. controlled) developing child autonomy in this regard.

The coding system was developed for videotaped observations of mothers and their children, during a snack period, at 12, 24, and 36 months of age. Accordingly, the snack setting was altered to accommodate the child's growing capacities. At 12 months, a high chair was brought into the observational laboratory. The mother's chair was placed to the left of the high chair and the snack tray was placed on a child-sized table to the left of her chair; all mothers placed their infants in the high chair. The mothers then either placed snack items on the high chair tray for the child to eat/drink, gave the items to the child, or fed the child. At 24 and 36 months, a child-sized table and chairs were in the observation room. The tray of snack foods was placed on the table, positioned between the mother and the child.

Videotaping was carried out through a one-way mirror in the laboratory setting. At every age, the mother was instructed by the researcher, when bringing in the snack tray, that this task was a "break" for them but that the camera would continue to record. She was told to inform us when they were finished or we would check back with her in 10 minutes. No other instructions were provided. At 24 and 36 months, the only other furniture in the room included a chair (used by the mother at 12 months), a lamp table with a lamp, and a floor lamp; there were no toys or other play items available to the child. The snack

situation was terminated when 1) the mother signaled before 10 minutes (rare), 2) when the researcher entered the lab after 10 minutes, or 3) when the mother signaled the completion of the segment after the 10-minute check.

The snack coding scheme was developed for the first 3 minutes of the videotaped interaction. The 3-minute coding period commenced when the infant was in the high chair and either the mother offered the first food item or the child made the first bid for food. There are 4 parts to the coding system: a) maternal and child behavioral frequencies; b) maternal and child behavioral classifications; c) a rating of dyadic mutual adaptation; and d) maternal and child affect ratings. The emphasis in this coding scheme was twofold. First, there was a concern for the nature and amount of child assertions in relation to maternal facilitation and inhibition of such autonomy. Balance in this regard may be manifested in any social conversation as well as in the negotiation and coordination of feeding/eating the snack. Second, there was a concern for the nature and amount of engagement or connectedness and enjoyment evidenced by the mother and child, evidenced primarily in the social conversation that typically attends the snack situation.

BEHAVIOR CODES

The first part of the coding system involved counting the frequencies of verbal and nonverbal behaviors indicating autonomy/control and engagement: child autonomy, child follow, mother direct (autonomy facilitating vs. behavior controlling), and mother follow. Actual frequency counts of these behaviors were made throughout the three-minute taped snack observation, and were entered into columns on the coding form.Behaviors are counted when topic changes rather than within topics.

Child Autonomy. Child autonomy entails the child's self assertions during the snack interaction. Autonomous behaviors are manifested as initiations of activity, initiations of conversational topics, assertions of needs, assertions of preference or choice, protestations, or refusals in response to maternal questions or presentation of choice. Such behaviors include both verbalizations and nonverbal behaviors

that are independent of the mother's verbalizations or behavioral actions; that is, they are not contingently responsive to maternal verbal or nonverbal behavior. Generally, a 3- or 5-second pause is considered sufficient opportunity for the infant to respond to the mother; any vocalization/verbalization thereafter is counted separately. Self-assertions are coded as *self-directed autonomy* and *other-directed autonomy*.

Self-directed autonomy refers to verbal and nonberbal behaviors that are self-occupied and contained way that excludes or ignores the mother. Nonverbal self-directed autonomy includes disengagement cues, such as looking away from mother, looking at the ceiling or elsewhere, when the mother is trying to engage the child or is verbalizing to the child. Other examples include feeding oneself, solo play and repetitive activities, such as kicking and noises, and imitating or mimicing mother's behavior at a molar level. Self-directed verbalizations do not carry intents to communicate to the mother nor expectations for her response. Eating behaviors are self-directed when the child changes to a new food item. If a child rejects a snack item but subsequently chooses it, or if the mother presents one item and then another and the child chooses the first item, these actions are scored as self-directed autonomy.

Other-directed autonomy are behaviors in which the child's agenda is conveyed to the mother. This includes verbal and nonverbal behaviors that indicate a need, preference or choice as well as child initiations of games, stories, actions or conversation topics. "Interactional behavior" often accompanies other-directed vocalizations, such as eye contact and physical orientation towards the mother. Such behaviors suggest an expectancy for the mother's response.

Conventional communicative gestures, such as pointing, reaching, pushing away, or nodding, are examples of nonverbal other-directed autonomy. Any verbalization that involves a statement of need/want, preference, choice, or refusal in relation to the snack activity is considered an expression of

other-directed autonomy. Responses to maternal questions or presentation of choice, when in agreement with an agenda suggested by mother, are coded as follow. Eating behavior is counted as other-directed when it represents a self-assertion directed to the mother. Thus, food refusals and preferences are both examples of other-directed autonomy along with requests for assistance and child feeding mother.

Child Follow. Child behavior that follows or adopts the mother's topic, activity, or direction is counted as follow. Following the mother's topic will typically be observed in the conversation. At 12 months, this will likely be in the form of imitating vocal sounds or efforts to repeat words, which may be a vocal sound or word approximation rather than the actual word. At 24 months, verbal skills will vary but it is more clear that the child is responding to mother and conveying an idea related to her topic. At 36 months, the responsiveness to the mother's topic should be clear. When the mother asks the child's preference or presents a choice for snack items, the child's statement of preference, choice, or concurrance is coded as a follow. Rejection is coded as an other-directed autonomy. There is no "delayed" following. Child follow must be contingent to the mother's behavior and "on topic". It may also reflect compliance with a mother's directive.

Mother Direct. Maternal directive behavior includes changes or maintance of topics in the face of child autonomy. Such behaviors may be observed verbally and nonverbally or behaviorally, and are characterized in two ways: autonomy facilitating and behavior controlling.

Facilitating directs. Verbally, facilitating directs carry an intention to socialize and teach rather than control, and includes social conversation, initiations of social conversation, or introducing any topic of conversation. Such behaviors include conversation and information-seeking questions ("Would you like some juice?"), explanations ("You need to drink slowly"), and instructions that are suggestive in tone rather than commanding ("Put the top on like this"). Voice tone is crucial to the nature of verbal directs; those that are positive and instructive or "teaching" in tone are more socially facilitating whereas those that carry a negative tone are more likely to be behavior controlling.

Nonverbal facilitating directs entails behavior that supports the child's developing autonomy, especially around eating. Behavior that facilitates autonomy includes laying out the food items or showing food items in a way that the child may assert a choice or preference, or providing food in a way that the child can self-pace the feeding and drinking.

Behavior controlling directs are maternal behaviors that constrain the behavior of the child; the mother expects compliance. Such behaviors can be directions or corrections following child autonomy (initiations), whether the child's autonomy was self-directed or other directed and verbal or behavioral. Thus, although the mother may appear to be following a topic initiated by the child, she is directing a change in the child's agenda.

Commands will typically carry heavy constraint on the child's behavior, allowing no alternatives or substitutions on the part of the child. They are often marked by the deletion of a grammatical subject; other forms specify the desired agent and behavior ("No..."; "Sit down"). Indirect commands are softened some or are less specific. They also serve to constrain the child's behavior and include requests ("Would you please just drink your juice?/eat?/sit down?"), suggestions ("How about drinking your juice/eating your cracker?/sitting down?"), complaints ("Oh, great; nice mess!"), demands ("I want you to drink your juice/eat that now/sit down now"), and threats ("If you spill that..."; "Want a spanking?").

Voice tone carries a fair amount of weight in determining whether maternal utterances are coded as facilitating vs. behavior controlling. In addition, the form of the sentence or how elaborated the sentence is will aid the determination as well, e.g. "Say juice..." vs. "Can you say juice?" or "*Juice*...Here is your *juice*." The same factors, voice tone and sentence form, will serve the distinction for social routines (please; thank you; hello; excuse you; bless you).

Nonverbal behavior controlling directs constrain the child's behavior and/or autonomy, especially with respect to eating/drinking. Such behavior typically implies a command if it is not accompanied by a verbal command or directive. Behavior controlling directs include feeding the child

juice from the tippy cup, offering food items according to the mother's agenda, limiting choice in some way (as with putting lid on container), cleaning up foods (except spilled juice), and ignoring or interfusing the child's autonomous cues. Any behavior that physically directs, controls, or constrains the child--e.g. manipulating the child's hand, pushing the hand, positioning the hand--is considered behavior controlling.

Mother Follow. Maternal follow is verbal or nonverbal contingent responding to the child's overture, cue, or bid. Maternal responses remain within the child's topic and intention, and entails interactive behavior and timing that allows for the child to continue or expand the topic. Verbal or nonverbal following serves to maintain, elaborate, or repeat the child's previous utterance, or to acknowledge, confirm or respond to a question, or to clarify.

Verbal follow. Mother verbal follow can be thought of as following into two categories: facilitating and acknowledging. *Facilitating follows* are social in nature and more conversant, reflective enhancing communications. They include maternal reflections on the non-observable feelings and/or experiences that are contingent on child behavior. The mother may verbalize her understandings of the motivations underlying her child's behavior ("you seem to want to do this yourself") or speculate on how the child may be feeling ("you seem hungry, unhappy"). The mother's verbal following brings things to the level of social conversation. *Acknowledging follows* are verbal responses to the child's agenda. These responses focus on the observable component of child behavior and may include labeling, descriptions, or comments about what the child is doing. This includes descriptions (apple juice is good") and questions (descriptions in question form) about the child's activity ("are you drinking from a red cup?").

Behavioral follow. *Behavioral follow* includes any nonverbal behavior that is contingently responsive to child cues, especially those autonomous cues around eating and social interaction. Behavioral following include waving back, and reaching for a food item that the child has pointed towards. Merely watching or looking at the child does not count as following.

BEHAVIOR PROPORTIONS

Child autonomy = OD/OD+SD

SD/OD+SD

OD+SD/OD+SD+F

OD/OD+SD+F

SD/OD+SD+F

Child follow =CF/MFD+MBCD

Maternal directs = AF/AF+BC

BC/AF+BC

AF+BC/AF+BC+AF+A+BF

Maternal follow = AF/AF+A+BF

A/AF+A+BF

BF/AF+A+BF

AF+A+BF/COD+CSD

CLASSIFICATIONS

The proportions are used in combination with more qualitative or clinical judgements about maternal and child engagement, and maternal sensitivity in assigning behavior classifications designed to describe the individual's style of interactive behavior in relation to the dyadic partner. The frequencies and proportions are intended to enhance the rigor of the behavioral classification but not to absolutely determine them. The addition of clinical judgement is essential for determining qualitative differences, especially whether maternal directs are autonomy facilitating or behavior controlling.

Child Classifications

Four classifications of child behavior were identified and developed according to how engaged the child was with the mother and according to the nature of the child's self-assertions. Engagement was assessed in terms of the child's perceptual awareness of and responsiveness to the mother, and the verbal and behavioral connectedness between them. Self-assertions were assessed in terms of whether they were

other-directed (to the mother or self-occupied. They were further noted for their level of aggression, protest, or other form of opposition for the sake of opposition. Behavioral proportions of child autonomy (in relation to all child behavior) and child follow (in relation to maternal facilitating and behavior controlling directs) were used to aid in the rigor of behavioral observation and classification but not to directly determine the classification.

Engaged assertive. The engaged-assertive child has nearly equivalent amounts of autonomy and follow. This child's interactive behavior is characterized by engagement with the mother. The child is perceptually alert and responsive to the mother, maintains an ongoing awareness of her, and willingly follows the mother's topics or intentions. At the same time, this child is readily able to assert preferences or needs and express choices to the mother, and introduces his/her own topics of conversation or interest as well. What is notable is that the self-assertions take place in the context of an ongoing, interactive connectedness with the mother. Assertions typically express feelings (excitement, frustration) and suggest an expectancy for maternal response. The activity of eating becomes the background for interactions rather than the focus on the interaction. Typically, at 24 months of age, self-directed autonomy is $\leq$ other-directed autonomy.

Intermittent engaged. The child with an intermittent engaged pattern of behavior also evidences an ongoing perceptual awareness of and responsiveness to the mother, and displays a fair amount of verbal autonomy directed to the mother, *in bouts*. These efforts intermittently result in an actual verbal engagement with her. Although the child spends time engaged in eating or other distractions and/or activities, it is important to note that the child is not ignoring the mother. The child seems to wait and watch for opportunities to play or have fun with the mother. The child's intermittent efforts to connect with the mother do not necessarily carry an expectancy for her response. Food and eating is the topic of interactions. Typically at 24 months, autonomy is less than follow but follow is moderate in relation to mother directs and self-directed autonomy is greater than other-directed.

Compliant disengaged. The compliant disengaged child evidences little self-assertion or social autonomy directed toward the mother. There is an element of ignoring, although there is also a perceptual awareness or monitoring of her behavior. Assertions directed towards the mother are related to food and focus on gaining access. If the child does initiate a social interaction, it often occurs later in the snack and usually not more than once. There is an absense of active resistance or refusal, thus the child appears to readily follow maternal directives. The compliant child is distinguished by a lack of connectedness with the mother and passive following of her directives. Other directed autonomy, especially social other-directs, is low in relation to follows.

Active disengaged. The behavior pattern for this classification includes autonomy that is self-occupied in nature, excluding the mother rather than being asserted or expressed to her. Other-directed autonomy tends to be around requests or demands for food rather than initiations of other topics. In fact, the active disengaged child is not oriented to the mother and appears to have limited perceptual awareness or responsiveness to her; the child may be ignoring. Frequently, the child will evidence disengagement cues--looking way from the mother, turning away from her, or looking at the ceiling. Self-assertions may be made with intensity; protests, frustration, and refusals are common. Other autonomous activity will typically be self-occupied, e.g. playing with food, banging on the tray or table, running to other parts of the room, or making faces in the mirror. This child may eat as if alone. The few following behaviors are typically related to eating rather than to social conversation and convey resistance, sometimes with force.

Maternal Classifications

Maternal classifications were identified and developed on the basis of patterned behavior that reflected maternal engagement with her child and the nature of her directiveness. Maternal engagement, as with child engagement, was assessed in terms of the mother's perceptual awareness of and responsiveness to the child, including the child's developmental agenda. Directiveness was assessed not

only in terms of its frequency in relation to all maternal behavior but with respect to what proportion of the directs were autonomy facilitating vs. behavior controlling. The proportions of behavior were used to assist in assigning the classifications but only in the context of the child's behavior and in light of interactional nuances and characteristics.

Facilitative engaged. The facilitative engaged mother has nearly equivalent proportions of directs and follows, her directs tend to be facilitating for the child and follows tend to be facilitative of the child's self understandings. She is perceptually aware of and responsive to the child's cues and self-assertions, and responds with sensitive timing and pacing that facilitates further self-expression by the child. Her structure is similarly sensitive in pacing and timing, allowing for child self-assertions and choices, and is responsive to the child's agenda..

A distinguishing feature of the facilitative engaged mother is her attentiveness to the child's developmental agenda for autonomous self-expression and mutual engagement. These factors are central even if proportions are similar to the facilitate disengaged behavior pattern. This mother typically conveys a genuine interest in the child (vs. simply watching or witnessing the child eating). Maternal verbal followings extend and further develop child-initiated topics. She may "give words" to her interpretations of the child's behavior or the mother may give words to the thoughts and intentions underlying her behaviors.

Controlling engaged. The controlling engaged mother has a fairly balanced distribution of directs and follows and/or the proportion of verbal follows may exceed the child other-directed autonomy. Verbal follows tend to focus on the child's observable behavior as acknowledging follows rather than facilitative follows. Further, verbal directs may be largely autonomy-facilitating whereas behavioral/ nonverbal directs are likely to be behavior controlling. Verbal followings tend to comment on the child's behaviors regarding maternal directives (ie, maternal agenda).

A distinguishing feature is her perceptual awareness of and responsiveness to the child is

insensitive to the pacing and timing necessary to facilitate the child's autonomous self expression and insensitive to the child's disengagement cues. It seems that her lack of genuine interest in the child is manifested as a certain disengagement or a "functional engagement;" the purpose of engagement centers on the child's acceptance or compliance with maternal agenda. This contributes to the mother's missing the child's disengagement cues while trying to elicit child responses or behavior irrespective of the child's interest, topic, intention or agenda.

Facilitative disengaged. Mothers with this behavior pattern tend to have less direct than follow or fairly equivalent proportions of direct and follow, with predominantly facilitative directs and predominantly responding follows. This pattern is not behavior controlling. Notable, however, is the pervasive lack of a sense of connection evidenced by the mother with her child. In this pattern, the mother seems to be watching the child and "acting" the role of parent, rather than having an ongoing perceptual awareness of - or sensitivity to - the child's agenda developmental or otherwise. Although this mother structures the eating of the snack, her child may take the initiative for sustained social interaction. The mother may evidence limited empathic responsiveness to or capacity to take the perspective of the child, rarely expressing her interpretations of child behaviors or the thoughts underlying her own behaviors. Thus, her responsiveness is evident primarily in relation to the overt or blatant autonomous cues and distress signals. Even with a positive affect then, the mother with this behavior pattern convey little genuine interest or enjoyment in the interaction with her child.

Controlling disengaged. This pattern of maternal behavior has a higher proportion of directs than follows. The directs may be evenly distributed between autonomy-facilitating and behavior controlling although most mothers of this behavior pattern will be behavior controlling in nature. The disengagement from the child is usually evidenced by a scarcity of following behavior. Regardless of the child's efforts to engage her, the mother seems unaware of the child's cues, behaviors, activity, or needs and may seem self-occupied. Thus, her behavior is not responsive to the child but reflects her own

agenda. Behaviorally, the mother's actions concerning food will over-ride or ignore the child's cues, including attempts to reach for food. However (at 24 months), if the mother does seem to "attend to the child" and respond to the child's cues, it is with the sense of watching or witnessing the child eat or with a sense of superficiality, rather than with a genuine interest in relating to the child.

MUTUALITY

The mutuality rating is intended to provide an assessment of the quality of social cooperation and negotiation of eating. The quality refers to how well each partner in the interaction responds to the other's behavioral cues in an adaptive, synchronous and reciprocal manner. The rating reflects the extent to which the goals around eating are negotiated, so that individual agendas are expressed, acknowledged, and followed. The rating is meant to reflect Sander's (1977) notion of mutual adaptivity and responsiveness as the "fitting together of the active tendencies" of each member of the dyad.

A rating of **1** is **poor,** reflecting low mutuality. The dyad shows little awareness of each other's agenda, with minimal negotiation, shared goals or emotional/social connectedness. Eating activities may become the basis of conflict. There is a pervasive sense of disconnection throughout the eating episode.

A rating of **2** reflects a **some** mutuality. Although there are a moderate level of cooperation and some negotiation, there are also occasions in which the other's agenda is not acknowledged or joint goals are not negotiated. There is an imbalance in responsiveness, with one partner initiating or following the majority of interactions. In general, eating activities are in the foreground and reflect a tone of cooperation, but with some emotional or social disconnection.

Dyadic mutuality is rated as a **3,** indicating a predominantly engaged dyad in which agendas are shared, negotiated and followed. The interactions are balanced in that both partners assert and follow. Eating activities are often in the background and social interactions in the foreground. Thus, eating becomes a context for engagement rather than the focus of the interaction.

AFFECT

This third part of the coding scheme is an assessment of affect for the mother and the child. A three-point rating scale was designed to reflect the overt behavior related to or arising from feeling toward the partner during the snack interaction. The mother and child are rated separately for the predominantly affective tone of the episode. The ratings were defined as follows:

Negative (1) — The overall tone is negative or sober and outweighs instances of positive affect. Negative affect is as subdued, flat, or sober, with rare animation. Conversely, negative affect may reflect anger, sadness, irritability, resistance, and/or negativity directed toward the partner.

Neutral (2) — An absence of a clear, overall or dominant polarized affect; clearly neutral as defined by positive or negative affect. Negative and positive qualitites are observe red in the manifest affect, leaving uncertainty re: truly positive or truly negative affect.

Positive (3) — Overall, the actor appears comfortable and content, or to be enjoying the interaction. A positive polarized affect is reflected in behavior, such as voice tone, facial expressions and verbal 0expressiveness. The episode is a pleasant one even if there are instances of sternness or instruction.

Snack Scale

MATERNAL CHILD PROFILES

Subject #_____
Age_____
Coder_____

	AUTOMONY		FOLLOW	
CHILD	Self-directed	Other-directed (social / resistance)	social	food/other

	DIRECTS		FOLLOW	
MOTHER	Facilitating	Controlling	Verbal	Behavioral

Child Classifications		Maternal Classifications	
Engaged - assertive	❐	Facilitative engaged	❐
Intermittently engaged	❐	Controlling engaged	❐
Compliant disengaged	❐	Superficial	❐
Active disengaged	❐	Controlling disengaged	❐

mutuality 1 2 3
c affect 1 2 3
m affect 1 2 3

Comments and notes:

Houck and Spegman, 1997