# INFANT TEMPERAMENT
# AND MATERNAL FEEDING PATTERNS

by

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# CHAPTER I

## INTRODUCTION

Infant temperament is a topic of increasing interest and concern for health care professionals because the concept recognizes the importance of the infant's contribution to the mother-infant interaction. Professionals who are aware of the role of temperament in mother-infant interactions are better able to interpret the infant's behavior to the mother and help her to accept the fact that she is not solely responsible for these behaviors. While infant nutrition and weight are important topics in today's health care, they have not historically been related to temperament. The purpose of this study is to investigate the possibility of a relationship between infant temperament and the feeding patterns employed by mothers, and the subsequent effect on infant weight.

Attempts to describe temperament began in 1963 (Thomas, Chess, & Birch). Since then temperament has been defined as the emotional reactivity or behavioral style displayed by the infant in the early months of life (Carey, 1970). Though temperament has been found to be well established by 2 to 3 months of age and to be stable over several months and perhaps years of time, it is not immutable and is as subject to change as are other personality characteristics (Thomas & Chess, 1977b).

The significance of feeding patterns in the mother-infant relationship was emphasized by Barnard (1977). She pointed out that feeding plays a central role in early associations between mother and infant, and that feeding patterns begin at birth and continue throughout childhood. Each participant brings interactive habits, emotional patterns, or individual reaction tendencies to the feeding situation.

Brody (1956) provides evidence that some of the early patterns of feeding persist beyond the newborn period. Research is necessary into the effects of the early mother-infant feeding patterns on the infant's attitudes toward the feeding process, the quantity and quality of food intake, and the interactive effects of personality and nutrition. Although the mother's style of interaction, life circumstances and other variables are essential aspects of the interaction, this study will focus on the effect of the mother's perception of the infant's temperament on subsequent feeding patterns used by the mother and on the effects of these variables in combination on infant weight.

## Review of the Literature

In the review to follow, infant temperament will be considered first, followed by the relationship of temperament to mother-infant interaction, and finally, maternal feeding patterns as an example of mother-infant interaction will be examined.

The term temperament refers to the "behavioral style of the individual, irrespective of the content, level of ability or motivation of the particular activity" according to Thomas and Chess (1977a). They initiated the New York Longitudinal Study (NYLS) in 1956 to test the proposition that individual temperament is a significant factor in child-environmental interactional processes. One-hundred and thirty-six subjects were followed from infancy until 5 years of age. The primary method of data collection was parent interviews, beginning when the child was 3 months of age, and continuing every 3 months until 1 year of age, and then every 6 months until age 5. The topics considered were the child's behavior in such situations as feeding, bathing, sleeping, and playing. Direct observation of the children's behaviors were also rated

and these findings agreed with the parental interview assessment at the .01 level of confidence. Later, teacher interviews were also conducted and these results correlated highly with information obtained from parents in interviews.

Nine categories of individual temperament or "patterns of reactivity" were identified: activity level or the motor component present in a child's functioning and the diurnal proportion of active and inactive periods; rhythmicity or the predictability and/or unpredictability in time of any functions; adaptability or the responses to new or altered situations; approach/withdrawal or the nature of the initial response to a new stimulus; intensity of reaction or the energy level of response; threshold of responsiveness or the intensity level of stimulation necessary to evoke a discernable response; quality of mood; distractibility or the effectiveness of environmental stimuli in interfering with ongoing behavior; and attention span/persistence or the length of time a particular activity is pursued by the child and the continuation of an activity in the face of obstacles. The study provided evidence that most of these characteristics were stable over time. Specific clusters of behavior were shown to be predictive of subsequent behavioral difficulties. Three constellations of temperament were defined: the "easy", the "difficult", and the "slow-to-warm-up" child. The "easy" child was characterized by biological regularity, positive approach responses to new stimuli, high adaptability to change and mild or moderately intense mood which was mostly positive. The "difficult" child was characterized by irregular biological function, negative withdrawal responses to new stimuli, nonadaptability to change, and intense mood expressions which were frequently negative. About 10% (14) of the NYLS sample was categori-

zed as "difficult" and 75% (10) of these infants later developed behavioral problems. The third type was labeled the "slow-to-warm-up" child. This infant was characterized by withdrawal responses, negative mood and slow adaptability but had mild reactions and may or may not have had irregularity of biological functions. Individual children vary widely in the degree to which they match these constellations. This study supported the theory that the child has innate temperamental characteristics which affect the parent-child interactions. The parent alone is not the sole cause of childhood behavior.

In order to test the external validity of the Thomas et al. (1963) study, other researchers conducted similar studies of temperament with other populations. Graham, Rutter and George (1973) studied 60 children, 3 to 7 years old, each having at least one mentally ill parent. Parents were interviewed initially and mothers were asked to complete behavior questionnaires about their children. A few days to a month later, a different interviewer administered a "temperamental characteristics" questionnaire and, for those children who were in school, the teachers were also asked to complete questionnaires.

Each child was rated on seven categories of behavior: mood, intensity of emotional expression, activity, regularity, malleability, fastidiousness and approach/withdrawal to new people. At the time of the first interview, 18 (41%) of the 44 children for whom parental behavior questionnaires were available were rated to be "abnormal", a year later 26 of 60 (43%) were rated to be "abnormal". The authors concluded that their study supported the findings of the NYLS. They noted that temperament characteristics in the children they studied were stable over time

and that some of these were predictive of later behavioral problems.

Carey (1970, 1972) attempted to clarify and adapt the Thomas et al. (1963) techniques which he believed were too lengthy and complicated to be practical for clinical use. To standardize his questionnaire, Carey conducted two studies. The first study was conducted on 101 subjects between 4 and 8 months of age. His second study included 200 infants, 114 were males and 86 were females. Eighty-three of the infants in the second study were first born and 117 were later born; 96% of the group was white, mostly middle class. The mothers completed questionnaires which consisted of 70 items concerning specific baby behaviors. Mothers were asked to rate their babies as "average", "above average", or "below average" as compared to other babies in each of the nine categories of temperament identified by Thomas et al. (1963). Infants were then classified as one of the following: "difficult", "high intermediate", "low intermediate", or "easy". Use of either the Carey questionnaire or the Thomas interviews identified the same percentage of babies with difficult temperaments in different but similar populations. In an attempt to validate Carey's measure, both techniques were applied to four babies. For 3 of the 4 babies, there was with one exception, complete agreement as to the ratings above or below the mean for the 5 major categories related to the "difficult child". In reliability testing for Carey's questionnaire, there was agreement in all major categories for the 3 babies between 6 and 7 months old. The fourth baby was under 3½ months and these results were discarded.

Carey revised his questionnaire in 1978 (Carey & McDevitt, 1978). The number of items was increased from 70 to 95 and rating options were increased from 3 to 6. The original Carey tool had been criticized for

the small number of items in some categories, and for the arrangement of items by content area which increased the probability of a response set. According to Carey and McDevitt, test-retest reliability was maintained with the revised scale and internal consistency was improved. Carey and McDevitt state that both questionnaires measure approximately the same phenomenon.

Temperament and Mother-Infant Interaction

Korner and Grobstein (1967) hypothesized that individual differences among infants evoke differences in mothering behaviors and affect the mother-infant interaction. Differences among infants in maturational rates, style of perceiving and experiencing, evoke different maternal responses. They based this hypothesis on findings from a study of 40 three day old infants who were bottle fed. To control for parity and for sex, the sample consisted of 10 first born, and 10 later born males, and 10 first born and 10 later born females. Only normal, healthy full term babies were included. Korner and Grobstein found that healthy full term neonates differ in behavioral responses to internal conditions such as hunger, and external conditions such as visual, auditory, textural, and tactile stimuli. Five variables were identified: response to internal and external stimuli, clarity in how hunger and fatigue are conveyed, degree that hunger tension will disorganize the behavior of the infant, psychosexual disposition, and the manner in which the baby defends against overstimulation. They contended that their observations had both long and short term implications. The differences in the five variables had immediate and subtle effects on mother-infant relationships. Follow-up observations could provide further evidence to relate infant characteristics and mothers' handling. It was suggested by the authors

that intermittent evaluations, timed with the developmental phases in which predicted behavioral traits are likely to emerge, would be most useful for further research.

Earlier, Korner (1965) had focused on the mutuality of interaction between mother and infant. Infants, differing in their needs and temperaments also differ in their capacity to communicate their needs. The formation of consistent and trustful internal sets of expectations may be hampered by the baby's unpredictable and indistinct experience of various states. The implications for child-rearing practices are broad if this factor is considered. The burden for developmental problems does not lie solely with the mother.

The contributions of the infant as an individual to the outcome of the mother-infant relationship has also been emphasized by Brazelton (1963, 1975). The strength of the infant's influence on the environment may be reflected by the extent of change in mothering behaviors. Using the observational method, Brazelton focused on the immediate adjustment period following delivery through the end of the first week. He measured lability, and direction of state changes, responsiveness, vigor, attentional excitement, tone, and motor activity. His purpose was to evaluate the mother-child relationship of his patients in order to provide insight, understanding and counseling for mothers. Brazelton believed that both the evaluation of the infant's innate capacities for interaction, and understanding of the mother can effect a positive start in the mother-infant relationship.

Thomas and Chess (1977a) in the NYLS demonstrated how temperamental traits of the infant affect parental attitudes and behaviors. Responses were frequently and strongly influenced by whether the infant has the

temperament consistent with the "easy" or "difficult" child. As may be the case with the "difficult" child, infant behavior may cause parents to feel threatened, resentful, or intimidated. The parents may be unable to provide the gradual exposure to new situations that the child requires. In such cases, parents may tend to respond with pressure, punishment, vacillation, and negative feelings such as hostility, impatience, and bewilderment. This can lead to intensification of the infant's negative mood and can become a vicious cycle. Usually the parents' attitudes and behaviors are considered the sole cause of the disorder. It is important that differences in temperamental characteristics be recognized for the manner in which they shape the infants' responses to the child care practices of the parent.

In contrast to the preceding studies which explored the two-way interaction, a study by Greenberg (1971), compared the behaviors and responses of 42 mothers to their male and female infants who exhibited atypical behavior, and of 16 mothers of male infants who exhibited typical behavior. Greenberg used parent interviews and observation of mother-infant interactions to collect his data. Although Greenberg described differences in infant behaviors, he did not consider these as instrumental in shaping the maternal responses. The appearance of atypical behavior was taken as evidence of disruption in development and as a consequence of inadequate, insufficient, faulty, extreme and abusive infant care and stimulation. Infant temperamental differences that may provoke such responses were not considered important.

To study the development of synchrony in mother-infant interaction, Thoman (1975) observed the spontaneous behavior of 240 infants when they

were alone and when they interacted with their mothers. Thoman found that developmental characteristics of infants contribute to mother-infant interactions both in a positive and negative manner. "Thus, each infant and mother contribute reciprocally to the other's failure to thrive as well as the faulty relationship between them" (p. 1588). The mother and infant are seen as a psychobiological system, characterized by mutual modification. Each mother-infant relationship is unique, a function of the individual characteristics of both mother and infant.

Moss in 1966 studied 30 infants and their mothers during the first three months of life. Direct observation was used to evaluate adaptation and interaction of mothers and infants. Moss found a positive relationship between irritability and maternal contact. He hypothesized a causal relationship between the infant's cry and maternal intervention. At first the mother is shaped by the infant and this later facilitates her shaping the behavior of the infant. The infant, through his own temperament and signal system, contributes to establishing the stimulus and reinforcement value eventually associated with the mother.

Prior to his work related to temperament, Carey (1968) studied maternal anxiety and its relationship to infantile colic among 103 newborns and their mothers. He used an interview to rate the extent and nature of maternal anxiety in the immediate postpartum period. Forty of the mothers expressed anxiety. Of the 103 infants, 13 (12.6%) had colic; 11 (27.5%) were infants of those 40 mothers expressing anxiety. A colicky baby was defined as "one who, otherwise healthy and well fed had paroxysms of irritability, fussing or crying lasting for a total of more than 3 hours a day and occurring on more than 3 days in any week"

(p. 591). Maternal anxiety was not the sole ingredient in the clinical picture of infantile colic. Most mothers who revealed anxiety did not have fussy babies. Carey suggested that if the infant's temperament or primary reactive pattern could be determined, those infants who are more easily reactive to environmental stimuli and are more susceptible to the disorganizing effects of maternal anxiety might be identified.

Bell (1974) theorized about the ability of the infant to effect change during early development in the areas of physical caregiving such as life support and protection and mutual social interaction. He claimed that infants were able to define their own limits; neonates define what they will or will not incorporate by swallowing or by spitting out what is given to them. Infants can reject solids, force mothers to return to bottle or breast feeding or fall asleep during scheduled feedings. The abilities of the infant to show alterations in state suggests an active contribution to the initiation of social interaction. It is important to realize that each period of interaction is capable of altering the status of a child so that during subsequent periods of interaction the child stimulates the parent in a different fashion or reacts differently to parent behavior. Although the infant is less mature than the parent, this does not preclude the existence of a reciprocal relationship. The individual who initiates an interaction by that very fact is exercising control over the other. The infant is thus very competent in bringing the parent to the general area and in producing desired behavior.

Rutter (1975) summarized research on the active participation of the infant on the interactive process. First, it is evident that the young infant has a surprisingly sophisticated response to his environment. Second, the infant's skills and capabilities influence the process of

parent-child interaction. Third, there are temperamental differences between infants which influence their response to the environment and how others react to them.

Feeding Patterns: An Example of Mother-Infant Interaction

Barnard (1977) contends that feeding plays a central role in the early associations between mother and infant. Behavior during feeding serves as a model for assessment of the mother's overall behavior towards the infant. The feeding experience is a natural situation in which to assess the communication, attachment and responsiveness of the mother and infant to each other.

As stated by Fomon (1974), the attitudes of the caretaker are important in the feeding situation of the infant. The amounts of food consumed reflect the interaction between infant and caretaker. Frequency of feedings, nursing by breast or bottle, and introduction of solid foods are determined by the beliefs, attitudes and demands on the caretaker's time and energies. In a breast fed infant the amount consumed is largely determined by the infant, but for a bottle fed baby, there may be subtle pressures to consume more, to reach an artificial endpoint determined by the bottle measurement. Parents need to be aware of the possibility that infant eating habits may contribute to overfeeding and consequent obesity. If it is true that an infant's temperament affects the mother's behavioral response, how does this factor affect the feeding patterns employed by the mother?

A major objection to the introduction of solids before 5 or 6 months of age is that the infant may not have sufficient neuromuscular control to refuse foods or indicate satiety. Thus the feeding of solids before this time may represent a type of forced feeding (Fomon, Thomas, Filer,

Ziegler & Leonard, 1979). It is believed that the early introduction of solids may contribute to overfeeding and the possibility of obesity in later life (Maslansky et al., 1974). Solids food intake also adds the electrolytes sodium, potassium and chloride. These electrolytes impose a heavy renal solute load which requires increased water for clearance and may stress the immature renal system in the young infant (Hammar, 1975).

Much attention recently has been focused on identifying critical periods of growth. Brook et al. (1972) suggested a critical or sensitive period extending from the 30th week of gestation through the first year of life. If hypercaloric intake takes place at this time, this may cause an increase in the number of adipose cells. However, there are still questions as to the accuracy of techniques to determine specific cell numbers and these theories have not been proven valid.

Fomon et al. (1979) emphasized that small, frequent feedings are preferable to the consumption of the same amounts of nourishment in large, widely spaced meals. Studies in adult meal frequency show that large meals at widely spaced intervals lead to increased serum cholesterol and decreased glucose tolerance. Although these effects on infants have not been studied, small frequent meals are thought to be advantageous.

According to Pipes (1977), volume intake of feedings are influenced by the mother's sensitivity and willingness to accept cues from the infant. If the infant's cues cannot be discriminated, food may be given for all discomforts. The ability of the infant to communicate his needs is instrumental in the mother's response.

Very little consideration has been given historically to feeding as a factor in early mother-infant interaction. Thoman's (1975) study on the development of synchrony focused on the feeding situation. Both bottle and breast fed infants were studied. Evidence was found that newborns differ in the feeding behaviors they bring to the first mother-infant interactions and that many of the infants' subtle feeding cues may not be obvious to primiparous mothers. Multiparous mothers were more sensitive to feeding cues than primiparous mothers. Thoman found a greater number of feeding epochs was used by the primiparous mothers during the neonatal period. It was suggested that some aspects of these early relations may be indicative of subsequent mother-infant relations.

Greenberg's (1971) comparative study of interaction related to typical versus atypical behavior in infants showed different feeding patterns in the two categories of infants. Mothers of atypical infants were confronted with unusual feeding behavior including vomiting, regurgitation, refusal to accept foods, retention of food in the mouth, weak sucking and rumination. These mothers were disinclined to offer feeding and non-nutritive sucking for soothing purposes while mothers of infants with typical behavior readily used feeding and sucking to soothe. Greenberg focused on the maternal contributions to the interactive feeding process. However, it would seem evident that maternal responses to the child's feeding habits must be influenced by infant behavior.

Hammar (1975), in his discussion of feeding practices, suggests that temperament may play a role in predisposing an infant to overfeeding. He suggested that large, placid babies may readily accept additional foods and may become obese. Other infants respond to overfeeding by vomiting, developing loose stools or refusing food.

Temperament and Feeding Patterns: Is There a Relationship?

The infant's role in determining feeding patterns may have short and long range implications. Carey (1972) pointed out the practitioner's role in helping young mothers to recognize the importance of their infant's temperament. Without evaluation of the infant's temperament, treatment would be based solely on the mother's observations and interpretations of infant behavior. Use of the Carey Infant Temperament Scale could help define the contribution the infant makes to the interactive process. If difficulties occur in and influence the feeding situation, then guidance can potentially prevent subsequent feeding problems.

A survey of infant feeding patterns by Maslansky et al. (1974) supports the theory that these patterns are crucial to the nutritional and emotional well-being of the infant. Factors such as whether foods are used to nourish or as a substitute for emotional deprivation, how new foods are introduced, and timing of feedings all contribute to the infant's temperament and capacities for interaction can help effect a positive start in the mother-infant feeding relationship.

A mother can be helped to recognize the situation of hunger and to accept the infant's expression of satisfaction so that she can set limits on amounts offered and overcome an inclination to overfeed (Pipes, 1977). A faulty interpretation of infant cues may lead to maternal anxiety and/or feeding problems that may have cyclical effects. Obesity prevention may begin in infancy. If an infant is allowed to stop feeding when satiated, this may encourage development of food intake regulatory mechanisms. Eating patterns established in infancy are reinforced by parents and can have far reaching effects on life patterns. The professional who

is aware of infant behavior can help mothers to recognize these infant cues.

The present study will focus on the relationship between infant temperament and the feeding patterns employed by the mother.

Conceptual Framework

The following conceptual framework has been suggested from the review of the literature. It serves as a rationale for the investigation of the relationship between infant temperament and maternal feeding patterns.

1. Each mother-infant relationship is a function of the individual characteristics of both mother and infant as they interact with each other.
2. Each infant brings an individual temperament or "pattern of reactivity" to the mother-infant relationship.
3. Feeding patterns are an example of early mother-infant interaction.
4. Variations in feeding patterns can lead to over or underfeeding and subsequent over or underweight.
5. Certain temperament classifications may influence mothers to use particular feeding patterns with their infants. An infant with an "easy" temperament may be fed more and become overweight whereas an infant with a "difficult" temperament may be fed less and become underweight.

The relationship between these variables has been suggested but not systematically analyzed in the literature. The current study will attempt to explore the following question: How does the temperament of the infant affect the feeding patterns employed by the mother?

Hypotheses

Infant temperament will affect the mother's feeding patterns so that: (a) Infants classified as "easy" will be fed more meals per day than infants classified as "difficult".

(b) Infants classified as "easy" will be fed at shorter time intervals than infants classified as "difficult".

(c) Infants classified as "easy" will be fed solids whereas infants classified as "difficult" will be fed formula only.

(d) Infants classified as "easy" will be fed more total calories per day than infants classified as "difficult".

(e) Infants classified as "easy" will tend to be overweight whereas infants classified as "difficult" will tend to be underweight.

# CHAPTER II

# METHODS

## Subjects

The subjects for this study consisted of 30 mothers and their 4 month old infants. Ten overweight, 10 average weight, and 10 underweight infants were studied. The sample was obtained from seven Clackamas County Well-Child clinics which serve a population of 210,000. Selection criteria for the mother required that she be primiparous, between 18 and 30 years old, the major caretaker of the infant, and living with the father of the infant. In addition, it was stipulated that she be a graduate of high school in order to provide a more homogeneous sample. Criteria for infant selection specified that at birth, the infant must have been classified as healthy and full term; birthweight should range between the 10th and 90th percentiles for all American infants as determined by the National Center for Health Statistics (NCHS) growth charts (Hamill et al., 1976). The baby must have been discharged from the hospital at the same time as the mother and must have remained in good health. This requirement was to exclude infants with weight gain or loss due to illness. Only bottle fed infants were included in order to estimate intake with greater accuracy. Infants who experienced milk intolerances were not included as special diets and experimentation may interfere with normal gain and feedings. Infants who were breast fed for only the first month or less were included because by the age of 4 months these infants are essentially considered artificially fed. Four month olds were chosen because at this time major weight gain or loss since birth is evident. By 4 months of age feeding patterns, daily schedule, and mother-infant interactions are usually established.

## Data Collection Instruments

Weight and length measurements were obtained at Well-Child clinics at the time of data collection and were plotted on the NCHS growth charts. Infant temperament was assessed according to the Carey Infant Temperament Scale (Carey, 1970, Appendix E). Feeding patterns were assessed according to data from a 24-hour recall of the previous day's diet (Appendix C).

### Measurement of the Independent Variable

Infant temperament was measured by Carey's original questionnaire (1970). It appeared more feasible to use the original, shorter instrument rather than the revised version (1978) in the busy and hectic setting of the Well-Child clinics. The instrument consists of 70 statements, each with 3 choices for evaluation describing specific behaviors of the baby in specific situations. Questions are directed towards descriptions of infants' actual responses rather than maternal reactions or interpretations. Ratings are obtained in the 9 categories of reactivity defined by Thomas et al., namely, activity, rhythmicity, adaptability, withdrawal, intensity, threshold, mood, distractibility, and persistence. Activity refers to the motor activity present in an infant. The average infant at 4 to 8 months is active. Rhythmicity represents the predictability or lack of predictability in relation to sleep, hunger, feeding patterns, and elimination. Initial response to a new stimulus (person, toy, food) is labeled approach/withdrawal. Withdrawal reactions are negative (crying, fussing, moving away) whereas approach responses are positive. The ease with which initial responses to new or changed situations can be modified measures adaptability. Threshold of responsiveness signifies the intensity level of stimulation necessary to evoke a dis-

cernible response. Low threshold means that little stimulation will evoke a response while a high threshold means that a strong stimulation is necessary. Intensity of reaction is the energy level of the infant's response regardless of quality or direction. The amount of pleasant/friendly or unpleasant/unfriendly behavior determines the quality of mood. Distractibility is the effectiveness of environmental stimuli in changing the direction of current behavior. Attention span refers to the amount of time an activity is pursued by the infant and persistence is the maintaining and continuation of an activity in the face of obstacles.

Each of the nine "categories of reactivity" is represented by a number of behavioral items. The mother describes her infant as displaying each behavior to an intense, variable, or mild degree. These ratings receive scores of 0, 1, and 2, respectively. When averaged across all items in a category, a score between 0 and 2 is assigned the infant on that dimension. The scores on all nine dimensions yield a profile of temperament for the infant. A low numerical score for intensity represents a highly intense child in contrast to the other "difficult" ratings which are represented by a high numerical score. (For details on scoring see Appendix F).

Using these scores, "difficult" babies were identified according to the criteria stipulated by Carey (1970). For Carey, the "difficult" baby is one having 4 or 5 different category ratings, 2 or more of which are greater than 1 standard deviation from the mean. Difficult categories include regularity, adaptability, approach/withdrawal, intensity, and mood. The "easy" baby is one having 0 to 2 such ratings, but none as

large as one standard deviation. Babies of "intermediate high" difficulty obtained 4 or 5 difficult ratings with 1 more than one standard deviation from the mean or 2 or 3 ratings more than one standard deviation from the mean. "Intermediate low" infants had 3 to 5 difficult ratings with none more than one standard deviation or 1 to 3 ratings with 1 more than one standard deviation from the mean (Carey, 1970).

The items included in Carey's questionnaire were based on the interview questions used by Thomas et al. Since Carey included the same item on his questionnaire as those used in the Thomas study (1963), Carey's instrument may share the validity and reliability of the Thomas measure. In order to assess content validity, nine categories of temperament were established by content analysis of patient interview protocols for the infancy period in the first 22 children studied. Item scoring was used, a 3 point scale was established for each category, and item scores were transformed into a weighted score for each category. Successive interviews of a given infant were not scored contiguously to avoid a "halo effect". The authors were able to conclude that the data of the parent interviews were a valid reflection of the infant's behavior. To further measure validity, parental scores were compared with direct behavioral observations of the infant by two independent observers. Ninety percent of the cases were identically rated. The level of confidence for agreement was $p < .01$. The reason for such high concurrence between parents' and observers' assessments was believed to be due to the specific and objective nature of the questions. The questions referred only to current behaviors. Intrarater reliability had a reliability coefficient of .90 ($p < .05$). Carey compared his findings with those of Thomas. By both methods, the average baby at 4 to 8 months of age was active, regular,

adaptive, high on initial approach, low in threshold, mild, predominantly positive in mood, distractible, and persistent. Carey also looked at the proportion of difficult babies found by using both techniques. Use of the 2 methods identified the same percentage of babies with difficult temperaments in different but similar populations.

To measure reliability, a subsample of mothers in the Carey group was sent a second questionnaire 2 weeks after the first (Carey, 1970). It was believed that 2 weeks was long enough for them to have forgotten most of their responses but not long enough for the infants to have changed significantly. The test-retest reliability coefficient was 0.84.

Measurement of the Dependent Variables

Weight was measured at the Well-Child clinics by the investigator using a balanced Detecto Doctor-Infant scale for all measurements to ensure consistency. Recumbent length was measured at the same time. A portable measuring board, consisting of a fixed headboard and moveable footboard with the infant lying supine with toes pointed upward was used. Skinfold measurements were not taken due to the difficulty in obtaining reproducible measurements for the first 2 to 3 years of life (Fomon et al., 1979).

Measurements for length and weight were plotted on the NCHS growth charts. Infants were divided into 3 categories: overweight, average and underweight. According to Hamill's criteria, weight for length greater than the 95th percentile is evidence of obesity. When length for age is above the 10th percentile but weight for length is less than the 5th percentile, this is considered underweight (Hamill, 1976).

Feeding patterns were assessed by the following measures: (1) the average number of hours between daytime feedings; (2) the number of

feedings per day; (3) the number of calories derived from formula, solids and juices, and (4) the total number of calories consumed per day. Interviews with each mother ascertained the infant's previous 24-hour intake (Appendix C). A chart was devised for each diet recall to summarize the findings (Appendix D). All infants were healthy on the interview date and mothers were asked if the diet for the previous 24 hours was typical for her infant. Caloric content was analyzed according to Church and Church (1975) and Gerber Products (1979).

## Design and Procedure

This study used an ex post facto, correlational, and descriptive design to relate the temperament scores of 30 infants to their weight status and to their mothers' feeding patterns. Mother-infant pairs meeting the criteria described above were selected when mothers brought their 4 month old infants for well-child examinations. After formal consent to participate in the research was obtained from the mothers (Appendix A), they were asked to complete a Background Information Sheet (Appendix B) and the Carey Infant Temperament Scale. Background data were collected as to socioeconomic level, educational background, and major language spoken in the home, although differences along these measures did not exclude mothers from participation in the study. Both verbal and written instructions were given to aid mothers to complete the questionnaires. The researcher was available to each mother during administration of questionnaires and offered to hold the infant for the time period required to provide the information. Questionnaires were coded to preserve anonymity of subjects. Data collected were examined to determine if a relationship existed between infant temperament (easy, difficult, or intermediate) and feeding patterns (number of meals, time intervals be-

tween meals, solids, caloric intake) and weight (over, average, or underweight).

# CHAPTER III

## RESULTS AND DISCUSSION

It was hypothesized that infant temperament would affect the mother's feeding patterns so that (a) infants classified as "easy" would be fed more meals per day than infants classified as "difficult"; (b) infants classified as "easy" would be fed at shorter time intervals than infants classified as "difficult"; (c) infants classified as "easy" would be fed solids whereas infants classified as "difficult" would be fed formula only; (d) infants classified as "easy" would be fed more total calories per day than infants classified as "difficult"; and (e) infants classified as "easy" would tend to be overweight whereas infants classified as "difficult" would tend to be underweight.

The results of the study will be presented in the following manner. First, the sample will be discussed. Next, descriptive findings regarding infant temperament and feeding patterns will be reviewed. Infant temperament will then be analyzed in its relationship to feeding patterns and weight. Differences in weight will be examined in relation to feeding patterns. The effect of caloric intake and temperament will be analyzed for their relative effect on weight, and finally, infant sex will be examined in relation to temperament and weight.

### The Sample

Subjects meeting criteria for inclusion in this study were selected over a 7-month period from mothers attending 7 Clackamas County Well-Child clinics. During this 7-month period, no major changes took place in the staffing or in nutritional teaching provided by the staff at the clinics. A total of 30 mothers and infants participated in the study.

Characteristics of the mother's age, education and family income are presented in Table 1. The median age for the mothers was 22.5 years. High school graduation was a requirement for participation in the study; the median number of years of education was 12 years. Median family income was $9,000 per year. English was the basic language spoken in all homes, although in 3 cases a second language was also spoken. All mothers were Caucasian.

Table 1

CHARACTERISTICS OF MOTHERS IN SAMPLE BY AGE, EDUCATION, AND FAMILY INCOME (N = 30)

| Characteristics | Number | Percent |
|---|---|---|
| Age (years) | | |
| 18-20 | 8 | 26.7 |
| 21-23 | 8 | 26.7 |
| 24-26 | 11 | 36.7 |
| 27-30 | 3 | 10.0 |
| Median | | 22.5 years |
| Education (years) | | |
| High school graduate | 16 | 53.3 |
| College | 10 | 33.3 |
| College graduate | 2 | 6.7 |
| Post graduate | 2 | 6.7 |
| Median | | 12 years |
| Family Income (dollars) | | |
| <$6,000 | 4 | 13.3 |
| $6,001 - $8,000 | 7 | 23.3 |
| $8,001 - $10,000 | 5 | 16.7 |
| $10,001 - $12,000 | 7 | 23.3 |
| $12,001 - $14,000 | 4 | 10.0 |
| $14,001 - $16,000 | 1 | 3.3 |
| >$16,001 | 3 | 10.0 |
| Median | | $9,000 |

This sample of mothers is similar in regard to age to the average primiparous mother in Oregon in 1979 whose median age was 22.6 years

(Oregon Center for Health Statistics, 1979). In respect to education, the median education level achieved by U.S. women was 12.4 years (Statistical Abstract of the U.S., 1978). This is also similar to the education level of the current sample.

The median yearly family income reported was $9,000 which is lower than the median of $13,427 reported for the average Caucasian family, with head of household under 35 years old, and with only the husband working (Statistical Abstract of the U.S., 1978). A possible reason for the lower incomes of the study sample is the fact that the population was drawn from mothers electing to use the county well-child clinics. A similar sample drawn from a private practice setting might have shown higher family incomes.

Infants

The infants ranged in age from 3 months, 3 weeks to 4 months, 1 week. Thirteen (43.3%) of the infants were male and 17 (56.7%) were female. Mean birthweight was 3472 gms. (7 lbs. 10 oz.). Infants were slightly heavier than the average white American infant whose birthweight is 3374 gms. (7 lbs. 7 oz.) (Statistical Abstract of the U.S., 1978). Mean 4-month weight was 6922 gms. (15 lbs. 4 oz.) and mean 4 month length was 64.5 cm. (25.4 in.). Means for the general population are lower, 6350 gms. (14 lbs.) and 62.7 cm. (24.7 in.) (Vital and Health Statistics, 1978). Infants in the present sample may have greater length and higher weights because of the study requirement that all infants be healthy and full term whereas national averages include all infants. All infants in this study were Caucasian whereas national averages include all races. Furthermore all infants in this sample were bottle fed although 13 (43.3%)

of infants were breast fed initially but not exceeding one month of age. It is believed that bottle fed infants gain weight more rapidly than breast fed infants (Fomon, 1979).

Several sample differences are noted between this study group and Carey's sample (1972). Mothers in Carey's study included 41% college graduates while in this sample only 6.7% of mothers were college graduates. Family incomes were also lower in this sample. This is probably because subjects were selected from county well-child clinics while Carey's sample were selected from a private practice setting. Carey's group may have included families with both mother and father working. In this sample none of the mothers were employed outside of the home. While all infants in this sample were firstborn, only 83 (42%) in Carey's group were firstborn. The present sample included infants approximately 4 months old while infants in Carey's study ranged in age from 4 to 8 months. Ninety-six percent of Carey's sample of mothers were Caucasian and 100% of the present sample were Caucasian. Although there are differences among the samples, these differences are not great with the exception of infant age. Keeping this in mind, it is possible to compare results from the two studies.

Descriptive Findings Relating to Infant Temperament

Mean scores assigned to the infants by their mothers in the present sample for the 9 temperament categories are presented in Table 2. Scores on the Carey scale range from 0 to 2, with higher scores signifying lesser activity, greater irregularity, greater withdrawal from stimuli, less adaptability, lower threshold, a more negative mood, nondistractibility, and nonpersistence. A lower score for intensity denotes a high level of intensity. It appears that infants in the present study are seen

as active, regular, adaptable, high in initial approach, low in threshold, mild in intensity, positive in mood, distractible, and persistent. The mean scores of the present sample are slightly higher, with the exception of intensity, than the scores in Carey's sample. However, when analyzed according to the Wilcoxon test, the differences in mean scores proved not to be statistically significant (2 tailed test). Hence the 2 samples yield basically similar results.

Table 2

SCORES OF PRESENT SAMPLE ON CAREY INFANT TEMPERAMENT SCALE COMPARED TO SCORES OF SAMPLE USED BY CAREY: MEAN SCORES AND STANDARD DEVIATIONS

| Temperament Characteristic | N = 30 Present Sample | | N = 200 Carey Sample (1972) | |
|---|---|---|---|---|
| | Mean | S.D. | Mean | S.D. |
| Activity | .58 | .26 | .49 | .31 |
| Rhythmicity | .70 | .45 | .55 | .47 |
| Adaptability | .43 | .36 | .34 | .26 |
| Approach/withdrawal | .56 | .40 | .47 | .33 |
| Threshold of Responsiveness | 1.13 | .35 | 1.09 | .38 |
| Intensity of Responsiveness | .89 | .39 | 1.06 | .31 |
| Mood | .55 | .35 | .41 | .23 |
| Distractibility | .60 | .33 | .54 | .31 |
| Persistence | .79 | .43 | .71 | .41 |

Wilcoxon Test, $p > .05$

In the present sample, 10 infants (33.3%) were classified as "easy", 9 (30%) as "intermediate low", 7 (23.3%) as "intermediate high", and 4 (13.3%) as "difficult". Carey's sample revealed a similar distribution: 38.5% of infants were classified as "easy", 35.5% were "intermediate low",

12% were "intermediate high", and 14% were "difficult". Despite sample differences, similar results were obtained in both groups.

Descriptive Findings Relating to Feeding Patterns

Characteristics of the feeding variables are summarized in Table 3. The average number of feedings per 24 hours for all infants was 5.07. There was a mean of 3.1 hours between daytime feedings. An occasional night feeding reported by a small number of mothers was not included in measurement of feeding intervals or the number of feedings per day. When caloric intake was calculated according to type of food, the breakdown was as follows: a mean of 584 calories per 24 hours was derived from formula, 39 from solids, and 14.7 calories from juices. The mean total caloric intake per day was 638. According to Fomon (1975) the average total daily caloric intake for a 3 to 5 month old at the 50th percentile for weight ranges from 640 to 675 calories. Infants in the present sample consumed similar amounts of calories to the average 3 to 5 month old.

Table 3

CHARACTERISTICS OF FEEDING VARIABLES OF 30 INFANTS

| Characteristic | Mean | S. D. | Range |
|---|---|---|---|
| Number of feedings per day[a] | 5.07 | .87 | 4-7 |
| Number of hours between feedings[a] | 3.12 | .61 | 2.0-4.3 |
| Number of calories from formula | 584.67 | 97.76 | 400-800 |
| Number of calories from juices | 14.67 | 25.15 | 0-60 |
| Number of calories from solids | 39.17 | 34.52 | 0-110 |
| Total number of calories per day | 638.51 | 123.92 | 440-860 |

[a](Does not include night feedings)

Infant Temperament and Feeding Patterns

The hypotheses state that infants classified as "easy" would be fed at shorter time intervals, fed more meals per day, fed solids as opposed to formula only, and fed more total calories per day than "difficult" infants. In order to test these hypotheses, temperament was first examined in its relationship to the mean number of total calories consumed per day (Table 4). It was found that the easier the infant's temperament, the higher the caloric intake per 24 hours. "Difficult" infants and "intermediate high" infants consumed approximately the same number of calories per day, 570 and 564 respectively. These data suggest support for hypothesis 1d.: that "easy" infants would be fed more total calories per day than "difficult" infants. Although it is recognized that the well fed infant may develop an easy temperament, it is assumed that temperament is present in infancy and is stable during this period (Thomas & Chess, 1973).

Table 4

ASSOCIATION OF INFANT TEMPERAMENT AND MEAN DAILY CALORIC INTAKE

| Temperament | Number of Infants | Mean Number of Calories | S. D. |
|---|---|---|---|
| Easy | 10 | 702 | 111.04 |
| Intermediate Low | 9 | 658 | 137.43 |
| Intermediate High | 7 | 564 | 82.64 |
| Difficult | 4 | 570 | 117.12 |

To examine the relationship between temperament and the other feeding variables, contingency tables were constructed. Inspection of Table 5 reveals that no significant relationship exists between infant temperament and the number of feeding episodes per day. Although 74% of "easy/

intermediate low" infants and 91% of "intermediate high/difficult" infants consumed 4 to 5 meals a day, these differences are not statistically significant. Seventeen of the 30 infants (57%) were fed exactly 5 times per day (Appendix G, Table A). These results do not support hypothesis 1a.

Table 5

CROSSTABULATION OF INFANT TEMPERAMENT AND NUMBER OF FEEDINGS PER DAY[a]

| | Number of feedings | | |
|---|---|---|---|
| Temperament | 4-5 | 6-7 | Total |
| Easy Intermediate Low | 14 (74%) | 5 (26%) | 19 (100%) |
| Difficult/Intermediate High | 10 (91%) | 1 (9%) | 11 (100%) |
| Total | 24 | 6 | 30 |

a = collapsed table

Temperament was also examined in its relationship to time intervals between meals (Table 6). Fifty-three percent of the infants were fed every 3 hours regardless of temperament classification. Hypothesis 1b. is therefore not supported.

Table 6

CROSSTABULATION OF INFANT TEMPERAMENT AND TIME INTERVALS IN HOURS BETWEEN FEEDINGS

| | Time intervals between feedings in hours | | | | | |
|---|---|---|---|---|---|---|
| Temperament | 2.5 | 3.0 | 3.5 | 4.0 | 4.5 | Total |
| Easy | 2 (20%) | 5 (50%) | 2 (20%) | 1 (10%) | 0 | 10 (100%) |
| Intermediate Low | 1 (11%) | 5 (55%) | 3 (33%) | 0 | 0 | 9 (100%) |
| Intermediate High | 1 (14%) | 4 (57%) | 1 (14%) | 0 | 1 (14%) | 7 (100%) |
| Difficult | 1 (25%) | 2 (50%) | 0 | 1 (25%) | 0 | 4 (100%) |
| Total | 5 | 16 | 6 | 2 | 1 | 30 |

With regard to hypothesis 1c., as was suggested by Hammar (1975), it was predicted that solids would be introduced earlier to the "easy" babies since they accept foods willingly. When temperament was analyzed in relation to the feeding of solids, there was no significant difference in temperament in the group fed solids and those on formula only (Table 7). Seven (70%) of "easy" infants were fed solids and 3 (75%) of "difficult" infants were also fed solids (Appendix G, Table B). Thus, hypothesis 1c. is not confirmed by the current study. The investigator wonders as to whether the early introduction of solids to the difficult infant might be related to attempts of the mother to placate a difficult infant or a misinterpretation of infant cues. Pediatric health care professionals including well-child clinic personnel currently recommend the introduction of solids sometime between 5 and 6 months of age (Fomon et al., 1979). It is also recognized that mothers receive advice from significant others who may suggest early feeding of solids. It was not determined whether health care professionals, family or friends were more influential in advising mothers.

Table 7

CROSSTABULATION OF INFANT TEMPERAMENT AND FORMULA OR FORMULA AND SOLID INTAKE[a]

| | Formula or formula and solids | | |
|---|---|---|---|
| Temperament | Formula | Formula and solids | Total |
| Easy/Intermediate Low | 7 (37%) | 12 (63%) | 19 (100%) |
| Intermediate High/Difficult | 4 (36%) | 7 (64%) | 11 (100%) |
| Total | 11 | 19 | 30 |

a = collapsed table

Infant Temperament and Weight

To test hypothesis 1e., temperament was crosstabulated by weight (Appendix G, Table C). Categories were collapsed to permit statistical analysis. When Fisher's exact test was applied, underweight infants differed significantly in temperament from "all others" ($p < .001$). They tended to be more "difficult" (Table 8). When overweight infants were compared to "all others", differences in temperament were again significant ($p < .05$) (Table 9). Forty-seven percent of the "easy/intermediate low" infants were overweight and 73% of the "intermediate high/difficult" infants were underweight. These results confirm the hypothesis that the "easy" infant would tend to become overweight. If infants perceived as having "easy" temperaments tend to be overweight and infants perceived as "difficult" tend to be underweight, this may be due to total caloric intake per day rather than the number of feedings, length of time between meals, or the inclusion of solids in the diet. The small size of the sample and the small number of "difficult" infants preclude a definitive statement of the mechanism whereby temperament results in over or underweight.

Table 8

CROSSTABULATION OF INFANT TEMPERAMENT AND INFANT WEIGHT: UNDERWEIGHT INFANTS COMPARED TO ALL OTHERS[a]

| | Weight | | |
|---|---|---|---|
| Temperament | Underweight | Average/Overweight | Total |
| Easy/Intermediate Low | 2 (10.5%) | 17 (89.5%) | 19(100%) |
| Intermediate High/Difficult | 8 (73%) | 3 (27%) | 11(100%) |
| Total | 10 | 20 | 30 |

a = collapsed table

Fisher's exact test, $p < .0001$

Table 9

CROSSTABULATION OF INFANT TEMPERAMENT AND INFANT WEIGHT: OVERWEIGHT INFANTS COMPARED TO ALL OTHERS[a]

| | Weight | | |
|---|---|---|---|
| Temperament | Underweight/Average | Overweight | Total |
| Easy/Intermediate Low | 10 (53%) | 9 (47%) | 19 (100%) |
| Intermediate High/Difficult | 10 (91%) | 1 (9%) | 11 (100%) |
| Total | 20 | 10 | 30 |

a = collapsed table

Fisher's exact test, $p < .05$

Feeding Patterns and Infant Weight

Table D (Appendix G) presents a crosstabulation of the number of feedings by infant weight. As a total group, 70 to 90% of all infants were fed 4 to 5 times per day. When the table was collapsed and Fisher's exact method was applied, first underweight infants were compared to "all others" ($p = .261$) (Table 10). Overweight infants were also compared to "all others" ($p = .367$) (Table 11). The number of feedings did not contribute significantly to the weight of the infants.

Table 10

CROSSTABULATION OF NUMBER OF FEEDINGS AND INFANT WEIGHT: UNDERWEIGHT INFANTS COMPARED TO ALL OTHERS[a]

| | Weight | | |
|---|---|---|---|
| Number of feedings | Underweight | Average/Overweight | Total |
| 4 - 5 | 9 | 15 | 24 |
| 6 - 7 | 1 | 5 | 6 |
| Total | 10 | 20 | 30 |

a = collapsed table

Fisher's exact test, $p = .261$

Table 11

CROSSTABULATION OF NUMBER OF FEEDINGS AND INFANT WEIGHT: OVERWEIGHT INFANTS COMPARED TO ALL OTHERS[a]

| | Weight | | |
|---|---|---|---|
| Number of feedings | Underweight/Average | Overweight | Total |
| 4 - 5 | 16 | 8 | 24 |
| 6 - 7 | 4 | 2 | 6 |
| Total | 20 | 10 | 30 |

a = collapsed table

Fisher's exact test, p = .367

Time intervals between feedings was crosstabulated by infant weight (Table 12). When these data were inspected, no significant relationship was found between these variables. It may be seen by adding the percentage of mothers who fed at 3.0, 3.5 and 4.0 time intervals that for 80% of infants the interval between feedings ranged from 3 to 4 hours. A possible reason for the lack of relationship between infant weight and either the number of feedings or the time intervals between meals might be the young age of the infants. Their digestive systems may be too immature to utilize food in the same way as adults so that the effect of timing may not be evident until later in childhood.

Table 12

CROSSTABULATION OF TIME INTERVALS BETWEEN FEEDINGS AND INFANT WEIGHT

| Time intervals | Underweight | Average | Overweight | Total |
|---|---|---|---|---|
| 2.5 | 2 (20%) | 1 (10%) | 2 (20%) | 5 |
| 3.0 | 5 (50%) | 5 (50%) | 6 (60%) | 16 |
| 3.5 | 2 (20%) | 2 (20%) | 2 (20%) | 6 |
| 4.0 | 1 (10%) | 1 (10%) | 0 | 2 |
| 4.5 | 0 | 1 (10%) | | 1 |
| Total | 10 (100%) | 10 (100%) | 10 (100%) | 30 |

When the relationship between infant weight and solids vs. formula only was examined (Appendix G, Table E), 42% of the infants fed solids were overweight whereas 45% of infants on formula only were underweight. When collapsed tables were analyzed, using Fisher's exact test, differences were not statistically significant (Table 13 & 14). The inclusion of solids does not seem to result in higher infant weight.

Table 13

CROSSTABULATION OF SOLIDS VS. FORMULA INTAKE ONLY AND INFANT WEIGHT: UNDERWEIGHT INFANTS COMPARED TO ALL OTHERS[a]

| Formula vs. formula and solids | Underweight | Average/Overweight | Total |
|---|---|---|---|
| Formula only | 5 (45%) | 6 (55%) | 11 (100%) |
| Formula and solids | 5 (26%) | 14 (74%) | 19 (100%) |
| Total | 10 | 20 | 30 |

a = collapsed table

Fisher's exact test, p = .179

Table 14

CROSSTABULATION OF SOLIDS VS. FORMULA INTAKE ONLY AND INFANT WEIGHT: OVERWEIGHT INFANTS COMPARED TO ALL OTHERS[a]

| | Weight | | |
|---|---|---|---|
| Formula vs. formula and solids | Underweight/Average | Overweight | Total |
| Formula only | 9 (82%) | 2 (18%) | 11 (100%) |
| Formula and solids | 11 (58%) | 8 (42%) | 10 (100%) |
| Total | 20 | 10 | 30 |

a = collapsed table Fisher's exact test, p = .138

Table 15 reveals a positive correlation between increased number of calories and increased weight. Underweight infants consumed a mean of 507 calories per day, average weight infants consumed 652 calories, and overweight infants had a mean of 759 calories per day. It is reasonable to assume that a higher intake of calories would result in greater weight.

Table 15

ASSOCIATION TABLE OF MEAN DAILY CALORIC INTAKE AND INFANT WEIGHT

| Weight | Number of Infants | Mean number of calories | S. D. |
|---|---|---|---|
| Underweight | 10 | 507 | 39.10 |
| Average | 10 | 651.5 | 96.09 |
| Overweight | 10 | 759 | 56.46 |

## The Effects of Infant Temperament and Total Caloric Intake on Infant Weight

To determine the relative importance of infant temperament and total caloric intake on infant weight, a stepwise multiple regression analysis was employed (Table 16). It may be noted that total daily caloric intake

emerged as the more important variable. This accounted for 71% of the variance in weight. Temperament increased the multiple R to .87. Together these variables account for 75% of the variance. These results, which are significant at the .0001 level support hypothesis 1d. and 1e. Total daily caloric intake is a much more important variable than infant temperament. A possible explanation for the added contribution of temperament may be that the infant with an "easy" temperament is able to utilize calories more efficiently so that they are contributing to body weight. The "difficult" infant, because of his personality traits and metabolic rate, may be utilizing more calories for maintenance of body functions and/or may have reduced breakdown and assimilation of nutrients and thus does not tend to gain weight at the same rate as the "easy" baby.

Table 16

STEPWISE MULTIPLE REGRESSION ON WEIGHT OF 4 MONTH OLD INFANTS OF TOTAL NUMBER OF CALORIES FED PER DAY, AND OF TEMPERAMENT. (N = 30)

| Variable | Simple r | Multiple R | $R^2$ | Beta Coefficient |
|---|---|---|---|---|
| Total number of calories fed per day | .84 | .84 | .713 | .75 |
| Temperament | -.55 | .87 | .750 | -.22 |

F = 40.5
Signif. = .0001

Other Findings

Infant Temperament and Sex

The relation of infant temperament to sex was examined via a cross-tabulation to further describe the study group (Table 17). There was no significant relationship found between temperament scores and the sex of the infant. Seven (41%) of the females were classified as "easy" where-

as 3 (23%) of male infants were rated as "easy". Six (46.2%) of male infants were identified as "intermediate low". For both sexes, more than half of the subjects were categorized on the easy end of the temperament scale. Carey found differences of a few percentage points in mean scores of male and female infants in all nine categories of temperament, but none were large enough to attain statistical significance except the difference in persistence. Male infants were found to be more persistent (Carey, 1972).

Table 17

CROSSTABULATION OF INFANT TEMPERAMENT AND SEX

| | Sex | | |
|---|---|---|---|
| Temperament | Male | Female | Total |
| Easy | 3 (23.1%) | 7 (41.2%) | 10 |
| Intermediate Low | 6 (46.2%) | 3 (17.6%) | 9 |
| Intermediate High | 2 (15.4%) | 2 (29.4%) | 7 |
| Difficult | 2 (15.4%) | 2 (11.5%) | 4 |
| Total | 13 (100%) | 17 (100%) | 30 |

Infant Weight and Sex

A crosstabulation of data regarding infant weight and sex revealed no significant relationship. There was an even distribution of average and overweight infants between the sexes (Table 18). Seven females (41.2%) were underweight whereas 3 males (23.1%) were in this class. The sample, however, consisted of only 17 females and 13 males so that the small size of the sample makes it difficult to draw inferences from these figures. Fomon et al. (1971) found that infant sex was unrelated to weight

gain or volume intake in infants 8 to 111 days old.

Table 18

CROSSTABULATION OF INFANT WEIGHT AND SEX

| | Sex | | |
|---|---|---|---|
| Weight | Male | Female | Total |
| Underweight | 3 (23.0%) | 7 (41.2%) | 10 |
| Average | 5 (38.5%) | 5 (29.4%) | 10 |
| Overweight | 5 (38.5%) | 5 (29.4%) | 10 |
| Total | 13 (100%) | 17 (100%) | 30 |

# CHAPTER IV

## SUMMARY AND CONCLUSIONS

Over and under feeding is a function of adults' perceptions of the nutritive needs of infants. Therefore it is important that health professionals be knowledgeable of infant nutritional needs and provide nutrition education to parents so that they may meet the needs of their infants appropriately. One area of knowledge that may be imparted to parents is the relationship of temperament to maternal-infant feeding practices. By knowledge of infant temperament, mothers can be helped to identify their infants' cues related to hunger and distinguish them from cues for other needs.

The present study was designed to explore the possibility of a relationship between the infant's temperament and both the maternal-infant feeding patterns, and consequent weight status of the infants. Specific questions which grew out of the hypothesis included the following:

1) Does the infant's temperament affect the infant feeding patterns employed by the mother?
2) How do the variables of infant feeding patterns such as number of feedings per day, interval length between feedings, solids vs. formula only, and total daily caloric intake affect the weight of the 4 month old?
3) Is there a relationship between infant temperament and weight of the 4 month old that may be due to the above mentioned feeding variables?

The study included 30 primiparous mothers of healthy,full term 4 month old infants. Mothers were 18 to 30 years of age, healthy, living with the father of the infant and had a minimum of 12 years of education.

Data were obtained from mothers in county well-child clinics. A background information questionnaire was designed by the investigator to determine eligibility for participation in the study and to provide descriptive data regarding the study subjects. The Carey Infant Temperament Scale was used to measure temperament and a 24-hour diet recall was used to measure feeding variables.

The major findings of the study indicate that there was a significant relationship found between infant temperament, total daily caloric intake, and infant weight. Although higher caloric intake contributed more significantly to weight, temperament was an added variable. An "easy" temperament was associated with overweight infants while "difficult" temperament was associated with underweight infants. The number of feedings per day, time interval between feedings, and the inclusion of solids do not appear to affect the infant's weight. There was an association between the total number of calories consumed and infant weight; higher total daily intake of calories was associated with greater weight.

The findings and problems encountered during this investigation suggest several possibilities for future research. The present study included 30 mothers and infants. A study needs to be conducted using a larger, randomized, more representative sample which would yield more valid results. In order to quantitate total caloric intake, only bottle fed infants were included in this study. This requirement excluded a large population of infants since there is an increasing number of breast fed infants today (Fomon et al., 1979). Future studies need to be conducted including breast fed infants as well as bottle fed infants to see if a similar temperament/weight relationship is found among bottle and

breast fed infants.

This study attempted to examine temperament as it relates to quantitative feeding variables. Feeding observations and the use of a feeding scale such as Barnard's, should be utilized to further enhance our knowledge of mother-infant feedings by looking at feeding environment, stimulation and response, and control of mother and baby in relation to temperament.

The data for the current study was collected in county well-child clinics where a typically noisy environment prevailed. Because of this fact, the length of the tools were kept to a minimum. A future study utilizing the longer revised Carey Infant Temperament Scale needs to be undertaken in an environment with few distractions. This needs to be done to see if similar results are obtained with the use of the revised scale. The temperament scale might be sent home with mothers and returned by mail or the study could be conducted in a quieter private practice setting or during a home visit.

A comparison between private practice vs. well-child clinic subjects needs to be undertaken to test differences between feeding patterns related to socioeconomic or cultural groups. Maslansky et al. (1974) found that cultural influences were pervasive in feeding patterns practiced by low income families in New York City. He noted an increase in consumption of empty calories associated with an increase in age of infants in these families. Maslansky also found that the early introduction of solids seemed to be culturally determined. More than half of the 451 infants surveyed started solids in the first month of life.

Parents involved in childbirth education and natural childbirth classes may perceive infants differently than those who experience standard in-hospital delivery and care without prior preparation.

Comparisons of perception of infant temperament and of maternal feeding patterns need to be made between these groups.

The present study showed evidence that although caloric intake is the major variable affecting infant weight, infant temperament does contribute to this. A study designed to measure utilization of calories could verify the contribution of infant temperament to weight gain if caloric intake could be controlled for.

Implications for Practice

This study has the following implications for practice: that better infant nutrition and positive feeding outcomes are possible with increased knowledge of nutrition variables and infant temperament may be one of these factors. Infant nutrition and weight gain or lack of gain are topics of interest to the general public and health professionals. Nurses in pediatric practice need to be aware of the various factors affecting weight and diet of infants and the potentially lasting effects of early nutrition. An example is the infant's ability to self regulate his intake if given the chance rather than reaching the artificial endpoint of a bottle measurement which may initiate a lifelong pattern of eating quantities unrelated to hunger. It is also necessary to note that mother-infant interaction is not a one-way process but that the infant plays an important role in determining the mother's behavior. If this information can be imparted to the mother, she might be helped to avoid some of the problems that overfeeding and overweight can have on her infant.

Awareness of infant temperament for reasons other than its relation to feeding and diet is also important. The nurse practitioner's advice

to mothers will be more flexible if she recognizes the variety of temperaments. She will not hold the mother responsible for infant's characteristics such as irritability, or nonadaptability. The Carey scale helps to identify the infant's temperament while minimizing maternal bias. The clinician can also help determine those aspects of behavior which are due to the infant's own emotional reactivity rather than those due to environmental influences.

A mother's participation in filling out the temperament questionnaire is also useful in that the thought required to respond to questions is helpful in increasing awareness of her infant's functioning. Thus the insight gained by the mother, regarding the individuality of her infant, can help the clinician advise and counsel the mother regarding her infant.

The study showed that infant temperament influences caloric intake and weight gain and the influence is statistically significant. Further studies are needed to identify the interplay of temperament upon caloric intake and weight gain; for example, what are the physiological mechanisms regulating the transformation of calories into weight gain.

The results of this study lead to further questions as to how the mother's temperament interacts with the infant's temperament to produce these feeding behaviors and infant responses; and how the mother's past experiences influence her mothering behaviors with a specific infant and the effect of these behaviors upon the infant temperament.

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# APPENDICES

# APPENDIX A

## Consent Form for Human Research

GRADUATE STUDIES DEPT.
SCHOOL OF NURSING

*Area Code 503 225-7790*

*Portland, Oregon 97201*



UNIVERSITY OF OREGON

HEALTH SCIENCES CENTER

INFORMED CONSENT FORM

I, _____, herewith agree to serve as
(First name) (Middle name) (Last)
a subject in the investigation named, "Infant Temperament and Maternal Feeding Patterns" by Harriet L. Moyer, R.N., B.S., under the supervision of Wilma Peterson, R.N., Ph.D. The investigation aims at relating infant temperament characteristics to mothers' feeding patterns.

The procedures to which I will be subjected are to complete a questionnaire consisting of background data on myself and my infant, and descriptions of the baby's behavior. The questionnaire will take approximately 20 minutes to complete. I also agree to be interviewed regarding my baby's diet. I may benefit indirectly from these procedures by contributing to a study which will help nurses learn about temperament characteristics that are involved in the feeding behaviors of mothers and infants. I understand there are no risks involved to myself or my child. The information obtained will be kept confidential. My name will not appear on the records and anonymity will be insured by the use of code numbers. It is not the policy of the Department of Health, Education and Welfare, or any other agency funding the research project in which you are participating, to compensate or provide medical treatment for human subjects in the event the research results in physical injury. The University of Oregon Health Sciences Center as an agency of the state, is covered by the State Liability Fund. If you suffer injury from the research project, compensation would be available to you only if you establish that the injury occurred through the fault of the Center, its officers or employees.

Harriet L. Moyer has offered to answer any questions that I might have about my participation in this study. I understand I am free to refuse to participate or to withdraw from participation in the study at any time without effect on my relationship with or treatment at _____.

I have read the foregoing.

_____ _____
(Date) (Subject's Signature)

_____
(Witness' Signature)

# APPENDIX B

## Background Information Sheet

Background Information

1. Mother's age _____.

2. Mother's education (circle level completed)

   Grade School: 1 2 3 4 5 6 7 8

   High School: 1 2 3 4

   College: 1 2 3 4

   Post graduate 1 2 3

   Other:

3. Mother living with father of infant Yes_____
   No _____

4. First full term pregnancy Yes_____
   No _____

5. Has mother been healthy since birth of baby? Yes_____
   No _____

   Has mother had any postpartum infection, postpartum depression?

   Yes_____
   No _____

6. Mother takes care of the baby most of the time Yes_____
   No _____

   Is not more than one meal fed by other family member or caretaker?

   Yes_____
   No _____ (If not, how many meals are fed by others?)

7. Infant's birthdate _____

8. Infant's birthweight _____

9. Infant's sex: Male _____

   Female _____

10. Baby has been healthy since birth: Yes_____
    No _____

11. Infant is primarily fed by Bottle _____
    Breast _____

Background Information

12. Has baby experienced any milk allergy or milk intolerance?

Yes_____
No _____

13. Baby came home from the hospital with mother? Yes_____
No _____

14. Mother's basic language is English? Yes_____
No _____

Other language spoken in the home. _____

15. Family income level: (Please check one)

Less than $6,000 _____

$6,001 - $8,000 _____

$8,001 - $10,000 _____

$10,001 - $12,000 _____

$12,001 - $14,000 _____

$14,001 - $16,000 _____

More than $16,001 _____

16. If your baby was initially breast fed, was breast feeding continued after one month? Yes_____
No _____

# APPENDIX C

## Diet Interview Guide

Diet Interview Guide

Introduction: The purpose of this study is to examine the feeding patterns of mothers. We hope to gain information which can help us see how the feeding patterns of mothers are influenced by the temperament of their baby. I would like to ask you some questions regarding your baby's diet yesterday. We will start with yesterday morning and continue through this morning.

1. Can you remember what time your baby woke up yesterday?

2. What time was the first feeding?

3. What did you offer? (amounts consumed)

Formula/milk type _____

amount_____

ready mix, concentrate, powder _____

type of measure used _____

Cereal type _____

amount_____

Fruit type _____

amount_____

Other type _____

amount_____

4. Did your baby have anything else at that time? type _____

amount_____

5. Can you remember the next time your baby had anything else to eat or drink? time _____

type _____

amount_____

6. Did your baby have a bottle with a nap? time _____

type _____

amount _____

7. When was your baby's next feeding?
   time _____
   type _____
   amount _____

8. Was a bottle or juice or any other liquid or snack offered?
   time _____
   type _____
   amount _____

9. Can you remember the next feeding?
   time _____
   type _____
   amount _____

10. Were any other bottles or snacks given?
    time _____
    type _____
    amount _____

11. Did your baby go to sleep with a bottle or awaken during the night for one?
    time _____
    type _____
    amount _____

12. Would you say yesterday was typical as far as your baby's feedings? If not, does he/she usually eat more frequently, less frequently, more or less formula or solids, more variety?

13. Were there any unusual circumstances yesterday that would have affected your baby's eating? (Fever, recent immunizations, weather conditions, extra activities, guests, etc.)?

14. Did your baby behave yesterday as he/she usually does?

15. Is there anything else you want to add or are there any questions?

# APPENDIX D

## 24 Hour Diet Summary Chart

24 Hour Diet Summary Chart

| Number of feedings | Time of feedings | Amount consumed | Formula calories | Juice calories | Solids calories | Total number of calories |
|---|---|---|---|---|---|---|
| Total number | a | | Total for day | Total for day | Total for day | Total for day |

a = Total number of hours between meals divided by number of intervals.

# APPENDIX E

Carey Infant Temperament Scale

(Carey, 1972)

## Carey Infant Temperament Scale

(Carey, 1972)

1. (a) Generally goes to sleep at about same time for night and naps (within 1/2 hour).
   (b) Partly the same times, partly not.
   (c) No regular pattern. Times vary 1-2 hours or more.

2. (a) Generally wakes up at about same time from night and naps.
   (b) Partly the same times, partly not.
   (c) No regular pattern. Times vary 1-2 hours or more.

3. (a) Generally happy (smiling, etc.) on waking up and going to sleep.
   (b) Variable mood at these times.
   (c) Generally fussy on waking up and going to sleep.

4. (a) Moves about crib much (such as from one end to other) during sleep.
   (b) Moves a little (a few inches).
   (c) Lies fairly still. Usually in same position when awakens.

With change in time, place or state of health:

5. (a) Adjusts easily and sleeps fairly well within 1-2 days.
   (b) Variable pattern.
   (c) Bothered considerably. Takes at least 3 days to readjust sleeping routine.

### Feeding

6. (a) Generally takes milk at about same time. Not over 1 hour variation.
   (b) Sometimes same, sometimes different times.
   (c) Hungry times unpredictable.

7. (a) Generally takes about same amount of milk, not over 2 oz. difference.
   (b) Sometimes same, sometimes different amounts.
   (c) Amounts taken unpredictable.

8. (a) Easily distracted from milk feedings by noises, changes in place, or routine.
   (b) Sometimes distracted, sometimes not.
   (c) Usually goes on sucking in spite of distractions.

9. (a) Easily adjusts to parents' efforts to change feeding schedule within 1-2 tries.
   (b) Slowly (after several tries) or variable.
   (c) Adjusts not at all to such changes after several tries.

10. (a) If hungry and wants milk, will keep refusing substitutes (solids, water, pacifier) for many minutes.
    (b) Intermediate or variable.
    (c) Gives up within a few minutes and takes what is offered.

11. (a) With interruptions of milk or solid feedings, as for burping, is generally happy, smiles.
    (b) Variable response.
    (c) Generally cries with these interruptions.

12. (a) Always notices (and reacts to) change in temperature or type of milk or substitution of juice or water.
    (b) Variable.
    (c) Rarely seems to notice (and react to) such changes.

13. (a) Suck generally vigorous.
    (b) Intermediate.
    (c) Suck generally mild and intermittent.

14. (a) Activity during feedings - constant squirming, kicking, etc.
    (b) Some motion: intermediate.
    (c) Lies quietly throughout.

15. (a) Always cries loudly when hungry.
    (b) Cries somewhat but only occasionally hard or for many minutes.
    (c) Usually just whimpers when hungry, but doesn't cry loudly.

16. (a) Hunger cry usually stopped for at least a minute by picking up, pacifier, putting on bib, etc.
    (b) Sometimes can be distracted when hungry.
    (c) Nothing stops hunger cry.

17. (a) After feeding, baby smiles and laughs.
    (b) Content but not usually happy (smiles, etc.) or fussy.
    (c) Fussy and wants to be left alone.

18. (a) When full, clamps mouth closed, spits out food or milk, bats at spoon, etc.
    (b) Variable.
    (c) Just turns head away or lets food drool out of mouth.

19. (a) Initial reaction to new foods (solids, juices, vitamins) acceptance. Swallows them promptly without fussing.
    (b) Variable response.
    (c) Usually rejects new foods. Makes face, spits out, etc.

20. (a) Initial reaction to new foods pleasant (smiles, etc.), whether accepts or not.
    (b) Variable or intermediate.
    (c) Response unpleasant (cries, etc.), whether accepts or not.

21. (a) This response is dramatic whether accepting (smacks lips, laughs, squeals) or not (cries).
(b) Variable.
(c) This response mild whether accepting or not. Just smiles, makes face or not expression.

22. (a) After several feedings of any new food, accepts it.
(b) Accepts some, not others.
(c) Continues to reject most new foods after several tries.

23. (a) With changes in amounts, kinds, timing of solids does not seem to mind.
(b) Variable response. Sometimes accepts, sometimes not.
(c) Does not accept these changes readily.

24. (a) Easily notices and reacts to differences in taste and consistency.
(b) Variable.
(c) Seems seldom to notice or react to these differences.

25. (a) If does not get type of solid food desired, keeps crying till gets it.
(b) Variable.
(c) May fuss briefly but soon gives up and takes what offered.

Soiling and Wetting

26. (a) When having bowel movement, generally cries.
(b) Sometimes cries.
(c) Rarely cries though face may become red. Generally happy (smiles, etc.) in spite of having bowel movement (b.m.)

27. (a) Bowel movements generally at same time of day (usually within 1 hour of same time).
(b) Sometimes at same time, sometimes not.
(c) No pattern. Usually not same time.

28. (a) Generally indicates in some way that is soiled with b.m.
(b) Sometimes indicates.
(c) Seldom or never indicates.

29. (a) Usually fusses when diaper soiled with b.m.
(b) Sometimes fusses.
(c) Usually does not fuss.

30. (a) Generally indicates somehow that is wet (no b.m.).
(b) Sometimes indicates.
(c) Seldom or never indicates

31. (a) Usually fusses when diaper wet ( no b.m.).
(b) Sometimes fusses.
(c) Usually does not fuss.

32. (a) When fussing about diaper, does so loudly. A real cry.
(b) Variable.
(c) Usually just a little whimpering.

33. (a) If fussing about diaper, can easily be distracted for at least a few minutes by being picked up, etc.
(b) Variable.
(c) Nothing distracts baby from fussing.

Diapering and Dressing

34. (a) Squirms and kicks much at these times.
(b) Moves some.
(c) Generally lies still during these procedures.

35. (a) Generally pleasant (smiles, etc.) during diapering and dressing.
(b) Variable.
(c) Generally fussy during these times.

36. (a) These feelings usually intense: vigorous laughing or crying.
(b) Variable.
(c) Mildly expressed usually. Little smiling or fussing.

Bathing

37. (a) Usual reaction to bath: smiles or laughs.
(b) Variable or neutral.
(c) Usually cries or fusses.

38. (a) Like or dislike of bath is intense. Excited.
(b) Variable or intermediate.
(c) Like or dislike is mild. Not excited.

39. (a) Kicks, splashes and wiggles throughout.
(b) Intermediate - moves moderate amount.
(c) Lies quietly or moves little.

40. (a) Reaction to very first tub (or basin) bath. Seemed to accept it right away.
(b) At first protested against bath.

41. (a) If protested at first, accepted it after 2 or 3 times.
(b) Sometimes accepted, sometimes not.
(c) Continued to object even after two weeks.

42. (a) If bath by different person or in different place, readily accepts change first or second time.
(b) May or may not accept.
(c) Objects consistently to such changes.

Procedures - Nail Cutting, Hair Brushing, Washing Face and Hair, Medicines

43. (a) Initial reaction to any new procedure: generally acceptance.
(b) Variable.
(c) Generally objects; fusses or cries.

44. (a) If initial objection, accepts after 2 or 3 times.
(b) Variable acceptance. Sometimes does, sometimes does not.
(c) Continues to object even after several times.

45. (a) Generally pleasant during procedures once established - smiles, etc.
(b) Neutral or variable.
(c) Generally fussy or crying during procedures.

46. (a) If fussy with procedures, easily distracted by game, toy, singing, etc., and stops fussing.
(b) Variable response to distractions.
(c) Not distracted. Goes on fussing.

Visits to Doctor

47. (a) With physical exam, when well, generally friendly and smiles.
(b) Both smiles and fusses: variable.
(c) Fusses most of time.

48. (a) With shots cries loudly for several minutes or more.
(b) Variable.
(c) Cry over in less than a minute.

49. (a) When crying from shot, easily distracted by milk, pacifier, etc.
(b) Sometimes distracted, sometimes not.
(c) Goes right on crying no matter what is done.

Response to Illness

50. (a) With any kind of illness, much crying and fussing.
(b) Variable.
(c) Not much crying with illness. Just whimpering sometimes. Generally his usual self.

Sensory - Reactions to Sounds, Light, Touch

51. (a) Reacts little or not at all to unusual loud sound or bright light.
(b) Intermediate or variable.
(c) Reacts to almost any change in sound or light.

52. (a) This reaction to light or sound is intense - startles or cries loudly.
(b) Intermediate - sometimes does, sometimes not.
(c) Mild reaction - little or no crying.

53. (a) On repeated exposure to these same lights or sounds, does not react so much anymore.
    (b) Variable.
    (c) No change from initial negative reaction.

54. (a) If already crying about something else, light or sound makes crying stop briefly at least.
    (b) Variable response.
    (c) Makes no difference.

Responses to People

55. (a) Definitely notices and reacts to differences in people: age, sex, glasses, hats, other physical differences.
    (b) Variable reaction to differences.
    (c) Similar reactions to most people unless strangers.

56. (a) Initial reaction to approach by strangers positive, friendly (smiles, etc.).
    (b) Variable reaction.
    (c) Initial rejection or withdrawal.

57. (a) This initial reaction to strangers is intense: crying or laughing.
    (b) Variable.
    (c) Mild - frown or smile.

58. (a) General reaction to familiar people is friendly - smiles, laughs.
    (b) Variable reaction.
    (c) Generally glum or unfriendly. Little smiling.

59. (a) This reaction to familiar people is intense - crying or laughing.
    (b) Variable.
    (c) Mild - frown or smile.

Reaction to New Places and Situations

60. (a) Initial reaction acceptance - tolerates or enjoys them within a few minutes.
    (b) Variable.
    (c) Initial reaction rejection - does not tolerate or enjoy them within a few minutes.

61. (a) After continued exposure (several minutes) accepts these changes easily.
    (b) Variable.
    (c) Even after continued exposure, accepts changes poorly.

## Play

62. (a) In crib or play pen can amuse self for half-hour or more looking at mobile, hands, etc.
(b) Amuses self for variable length of time.
(c) Indicates need for attention or new occupation after several minutes.

63. (a) Takes new toy right away and plays with it.
(b) Variable.
(c) Rejects new toy when first presented.

64. (a) If rejects at first, after short while (several minutes) accepts new toy.
(b) Variable.
(c) Adjusts slowly to new toy.

65. (a) Play activity involves much movement - kicking, waving arms, etc. Much exploring.
(b) Intermediate.
(c) Generally lies quietly while playing. Explores little.

66. (a) If reaching for toy out of reach, keeps trying for 2 minutes or more.
(b) Variable.
(c) Stops trying in less than 1/2 minute.

67. (a) When given a toy, plays with it for many minutes.
(b) Variable.
(c) Plays with one toy for only short time (only 1-2 minutes).

68. (a) When playing with one toy, easily distracted by another.
(b) Variable.
(c) Not easily distracted by another toy.

69. (a) Play usually accompanied by laughing, smiling, etc.
(b) Variable or intermediate.
(c) Generally fussy during play.

70. (a) Play is intense: much activity, vocalization or laughing.
(b) Variable or intermediate.
(c) Plays quietly and calmly.

# APPENDIX F

## Carey Temperament Questionnaire Scoring Sheet

| | Activity | | | Rythmicity | | | Adaptability | | | Approach/ Withdrawal | | | Threshold | | | Intensity | | | Mood | | | Distract- ibility | | | Persistence | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | H | M | L | R | V | I | A | V | N | A | V | N | H | M | L | I | V | M | P | V | N | D | V | N | P | V | N |
| 0 | 4a | b | c | 1a | b | c | 5a | b | c | | | | | | | | | | 3a | b | c | 8a | b | c | | | |
| | | | | 2a | b | c | 9a | b | c | | | | | | | | | | | | | | | | | | |
| | | | | 6a | b | c | | | | | | | | | | | | | | | | | | | | | |
| | | | | 7a | b | c | | | | | | | | | | | | | | | | | | | | | |
| 10 | 13a | b | c | | | | | | | 19a | b | c | 12a | b | c | 15a | b | c | 11a | b | c | 16a | b | c | 10a | b | c |
| | 14a | b | c | | | | | | | | | | | | | 18a | b | c | 17a | b | c | | | | | | |
| 20 | | | | 27a | b | c | 22a | b | c | | | | 24c | b | a | 21a | b | c | 20a | b | c | | | | 25a | b | c |
| | | | | | | | 23a | b | c | | | | 28c | b | a | 26a* | b | c | 26c* | b | a | | | | | | |
| | | | | | | | | | | | | | | | | | | | 29x | b | a | | | | | | |
| 30 | 34a | b | c | | | | 35a* | b | c | | | | 30c | b | a | 32a | b | c | 31x | b | a | 33a | b | c | | | |
| | 39a | b | c | | | | | | | | | | | | | 36a | b | c | 35a* | b | c | | | | | | |
| | | | | | | | | | | | | | | | | 38a | b | c | 37a | b | c | | | | | | |
| 40 | | | | | | | 41a | b | c | 40a | x | c | 42a* | b | c | 48a | b | c | 45a | b | c | 46a | b | c | | | |
| | | | | | | | 42a* | b | c | 43a | b | c | | | | | | | 47a* | b | c | 49a | b | c | | | |
| | | | | | | | 44a | b | c | | | | | | | | | | | | | | | | | | |
| | | | | | | | 47a* | b | c | | | | | | | | | | | | | | | | | | |
| 50 | | | | | | | 53a | b | c | 56a* | b | c | 51a | b | c | 52a | b | c | 50c | b | a | 54a | b | c | | | |
| | | | | | | | | | | | | | 55c | b | a | 57a | b | c | 56a* | b | c | | | | | | |
| | | | | | | | | | | | | | | | | 59a | b | c | 58a | b | c | | | | | | |
| 60 | 65a | b | c | | | | 61a | b | c | 60a* | b | c | | | | | | | 60a* | b | c | 68a | b | c | 62a | b | c |
| | | | | | | | 64a | b | c | 63a | b | c | | | | | | | 69a | b | c | | | | 66a | b | c |
| | | | | | | | | | | | | | | | | 70a | b | c | | | | | | | 67a | b | c |

x=no score
*=score in 2 categories
a=0, b=1, c=2

$$\text{total score for each category} = \frac{(0 \cdot \text{number of a responses}) + (1 \cdot \text{number of b responses}) + (2 \cdot \text{number of c responses})}{\text{number of questions in category}}$$

# APPENDIX G

## Supplementary Tables

Table A

CROSSTABULATION OF INFANT TEMPERAMENT AND NUMBER OF FEEDINGS PER DAY

| | Number of feedings | | | | |
|---|---|---|---|---|---|
| Temperament | 4 | 5 | 6 | 7 | Total |
| Easy | 3 | 6 | 0 | 1 | 10 |
| Intermediate Low | 2 | 3 | 3 | 1 | 9 |
| Intermediate High | 1 | 5 | 0 | 1 | 7 |
| Difficult | 1 | 3 | 0 | 0 | 4 |
| Total | 7 (23%) | 17 (57%) | 3 (10%) | 3 (10%) | 30 (100%) |

Table B

CROSSTABULATION OF INFANT TEMPERAMENT AND FORMULA OR FORMULA AND SOLID INTAKE

| | Formula or formula and solids | | |
|---|---|---|---|
| Temperament | Formula | Formula and Solids | Total |
| Easy | 3 (30%) | 7 (70%) | 10 (100%) |
| Intermediate Low | 4 (44%) | 5 (56%) | 9 (100%) |
| Intermediate High | 3 (43%) | 4 (57%) | 7 (100%) |
| Difficult | 1 (25%) | 3 (75%) | 4 (100%) |
| Total | 11 | 19 | 30 |

Table C

CROSSTABULATION OF INFANT TEMPERAMENT AND INFANT WEIGHT

| | Weight | | | |
|---|---|---|---|---|
| Temperament | Underweight | Average | Overweight | Total |
| Easy | 0 | 5 (50%) | 5 (50%) | 10 |
| Intermediate Low | 2 (20%) | 3 (30%) | 4 (40%) | 9 |
| Intermediate High | 5 (50%) | 2 (20%) | 0 | 7 |
| Difficult | 3 (30%) | 0 | 1 (10%) | 4 |
| Total | 10 (100%) | 10 (100%) | 10 (100%) | 30 |

Table D

CROSSTABULATION OF NUMBER OF FEEDINGS AND INFANT WEIGHT

| | Weight | | | |
|---|---|---|---|---|
| Number of feedings | Underweight | Average | Overweight | Total |
| 4 - 5 | 9 (90%) | 7 (70%) | 8 (80%) | 24 |
| 6 - 7 | 1 (10%) | 3 (30%) | 2 (20%) | 6 |
| Total | 10 (100%) | 10 (100%) | 10 (100%) | 30 |

Table E

CROSSTABULATION OF SOLIDS VS. FORMULA INTAKE ONLY AND INFANT WEIGHT

| Formula vs. formula and solids | Weight | | | |
|---|---|---|---|---|
| | Underweight | Average | Overweight | Total |
| Formula only | 5 (45.5%) | 4 (36.4%) | 2 (18.2%) | 11 (100%) |
| Formula and solids | 5 (26.3%) | 6 (31.6%) | 8 (42.1%) | 19 (100%) |
| Total | 10 | 10 | 10 | 30 |

AN ABSTRACT OF THE THESIS OF

HARRIET L. MOYER

FOR THE MASTER OF NURSING

Date Receiving this Degree: June 12, 1981

Title: INFANT TEMPERAMENT AND MATERNAL FEEDING PATTERNS

Approved: [redacted]
Wilma E. Peterson, Ph.D., Thesis Advisor

Infant temperament has become a topic of increasing interest to health care professionals because it recognizes the infant's contribution to the mother-infant interaction. Infant nutrition and weight are also important topics in today's health care. Historically temperament has not been related to nutrition and weight. The present study was conducted to explore the relationship between infant temperament and maternal feeding patterns and the effects of this interrelationship upon infant weight. The knowledge gained may be useful for the health care professional in health teaching and guidance of mothers in nutritional and behavioral counseling.

A sample of convenience was drawn consisting of 30 primiparous mothers with healthy, full-term infants, 4 months of age. Mothers were 18 to 30 years old, healthy, and had a minimum of 12 years of education. Data were obtained at county Well-Child clinics via questionnaires, the Carey Infant Temperament Scale and a 24-Hour Diet Recall.

The major findings of the study regarding infant temperament and feeding variables indicate that the number of feedings, time intervals between feedings, and the inclusion of solids in addition to formula are not significantly related to infant temperament but higher caloric in-

take is related to an "easy" temperament and lower caloric intake is related to a "difficult" temperament. Infant temperament is also significantly related to infant weight: infants with "easy" temperaments tended to be overweight and infants with "difficult" temperaments tended to be underweight. Higher total caloric intake was also related to higher weight but other feeding variables were not related to weight. Multiple regression analysis demonstrated that total caloric intake is a much more important variable than infant temperament but temperament is an added variable related to weight.

Further research strategies are suggested and conclusions are drawn. Implications of the findings for health care delivery are indicated.