# FAMILY STRESS AND INFANT GROWTH PATTERNS

by

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## TABLE OF CONTENTS

TABLE OF CONTENTS--Continued

## LIST OF TABLES

## LIST OF TABLES--Continued

## LIST OF TABLES--Continued

## LIST OF ILLUSTRATIONS

## LIST OF ILLUSTRATIONS--Continued

## ABSTRACT

Hypotheses explaining childhood growth in relation to environmental variables were explored retrospectively in families of 84 children from birth to three years. Child temperament, maternal satisfaction with her social support network, and family life events for measuring stressfulness were correlated with weight/length and skinfolds sum measures. Growth rates exhibited high variability in most children. Behavioral style was not associated with growth variables. Support factors, expecially size and frequency of contact and some degree of relationship quality, were positively associated with growth. Life events incidence was positively associated with growth variables but was not associated as strongly as support factors. The population consisted of Mexican American and Anglo families at various educational and financial levels. Growth appeared sensitive to some family environmental factors whether directly related or mediated by some unmeasured variable. Clinical use of assessing family supports and stresses appears to provide additional understanding of pediatric nurturance-growth associations.

# INTRODUCTION

One of the primary concerns that a pediatrician holds for the infant and toddler is the maintenance of steady growth in the child's genetically determined weight and height percentiles. If the individual falters or gains excessively from one checkup to the next therapeutic support is begun and careful monitoring continues. Beyond treatment prevention is sought through indicators forewarning the initiation of growth aberrations.

Studies in child growth attempt to disect and categorize the many factors involved in the etiology of growth disorders, including obesity and growth failure. Some previously stated hypotheses have gathered supportive empirical evidence over time. Others have become controversial through the conflicting results from observations continued since their initial proposals. Further expansion of the supported theories is needed as well as continued exploration for new viewpoints of children's developmental problems.

The objective of this study was to explore retrospectively the associations between six month interval and overall growth rates of a set of healthy infants from birth to age three and their family's environment via major life events occurring during that period, strength of the maternal support system and the child's temperament. Stress, support and personality may combine to alter growth rates directly or otherwise. If children have

growth rates during specified periods that are either impeded or increased beyond usual bounds, then those families' social environments may be stressed more during these times than during other times which exhibit steadier growth rates.

## LITERATURE REVIEW

### Growth Velocity

Growth velocity measured over consistent time periods is more sensitive in the detection of developmental aberrations than evaluating the child's attained growth cross-sectionally against a population (Falkner 1973, Tanner 1978). Longitudinal velocity measures are purported to be more sensitive than the commonly used "distance" charts for viewing subtle changes in growth rate (Roche and Himes 1980, Pomerance 1979, Tanner 1978). Velocity curves have come into more frequent use with the introduction of a few standardized curves which have been derived from longitudinal studies of primarily caucasian children. These charts were constructed using measurements on the same cohort(s) throughout the entire span of ages plotted. Some charts (Roche and Himes 1980, Tanner and Whitehouse 1976) plot the percentile distributions of the sex-specific absolute length and weight increases occurring through each discrete time period. Another type of velocity scale (Pomerance 1979) shows the distribution percentiles of the ratio change in length or weight by sex in each period; that is, the difference between the endpoint measure from the initial measure is taken over the initial measurement. Some of these charts report no seasonal effects per six month increments in growth velocity (Roche and Himes 1980, Pomerance 1979), a phenomenon which usually occurs for both weight and length (Sinclair 1978).

Tanner and Whitehouse (1976) plot growth velocities as annual means to eliminate the effects of seasonal flux and therefore improve the chart's utility. Therefore, comparison between cohorts of different birth months should not be hampered using these types of scales.

The more commonly used distance growth charts such as the NCHS plots (Hamill et al 1979) display the percentiles of attained growth parameters by measuring different cohorts of children at each point in time. This cross-sectional display cannot be used to determine the current tempo of growth since attained growth measured in distance charts is the product of forces cumulated over the child's entire life. The original purpose of cross-sectional charts was for comparison of populations rather than to follow an individual's growth (Tanner 1978). However, even though distance charts indicate the location of an individual in relation to the population, the attending pediatrician may show concern over the child's growth if the child dramatically shifts percentiles. A combined use of both distance and velocity charts may yield a more precise view of the individual through historical and current growth perspectives.

Finally, a longstanding concept in early growth is that of canalization in which a tendency is observed for children to catch-up or fall back in growth to maintain their original size relative to the population (Tanner 1978). The child's growth will seemingly self-correct for an event which seems to change its progress towards a genetic set point. Particularly in the first

six months of life an infant's growth rate will shift in reaction to the conditions, favorable or unfavorable, that were present during the intrauterine period in order to reach its genetic potential (Falkner 1973). At least one study of healthy, well-nourished children under three years of age (Harrison in press) demonstrates that most children subject to one period of rapid or slow growth will compensate with the other extreme to offset the original deflection.

This study concentrates on family environmental factors and personality structures which may influence the occurrence, frequency or direction of periods of extreme growth velocity. Does a stressful or supportive family environment and child temperament play a role in growth changes? If an association is revealed perhaps these family factors may be included among proposed hypotheses to be tested further for their strength of relationship to growth aberrations.

## Etiologies of Obesity and Growth Failure

Before looking more fully at the family's influence on child health and growth a brief overview of proposed etiologies for infant obesity and growth failure may help to set the stages for viewing family environment in more detail.

Many etiologies have been proposed regarding infant obesity. Dwyer and Mayer (1973) provide the view of the early 1970's research. Etiologies of that period include maternal

inability to interpret infant hunger and satiety, breast versus bottle feeding, early introduction of solids, decreased activity rates, formula concentration, chubbiness as an ideal body weight. Some are disputed now by more recent studies in the late seventies while others remain strong. For example, bottle feeding and early age for introduction of solids have not been shown to significantly differentiate obese and non-obese infants (Weil 1977, Dubois, Hill and Beaton 1979, Edelman and Maller 1982). Recent comments (Edelman and Maller 1982) focus on the lack of research in how social and environmental factors influence the development of eating and activity styles. Familial environmental factors have risen to have a significant influence on development of obesity (Weil 1977), but what these factors are specifically is still in question.

The non-organic etiology of growth failure, maternal deprivation and related disorders appears more clearly defined. Generally there is disturbed parent-child communication enhanced by situational stresses on the parents such as family crises, social isolation, young child bearing age, marital troubles, unwanted pregnancy and low income (Gray et al 1977, Kallen and Seagull 1977, Kristiansson and Fallstrom 1981). An area not completely addressed with regard to low weight gain in infants deals with whether some or all of these etiologic factors for failure to thrive, the extreme example of low gain, can apply to children of less dramatic subnormal growth. How influencial family factors are in subnormal growth remains of interest to

child development observers for their predictive value in prevention of these abnormalities.

## Family Environment in Children's Health and Growth

With time family environment has gained prominence in research as a valid factor in the cause and course of illness in general. The World Health Organization reports that

> many of the strains and maladjustments which place an increasing burden on pediatric, general medical, and psychiatric services can be understood and efficiently tackled only after due attention has been given to the family setting. The fact that the family is a unit of illness because it is the unit of "living" has been grossly neglected in the development of statistical tools suitable for coping with this set of problems, and in the provision of statistical data essential for an investigation of the individual as part of the family in illness as well in health (Litman and Venters 1979, p. 379).

Both the emotional and physical development of a child take place within the family environment. The effect of family on emotional growth is presented more conclusively in the literature than is its effect on physical health and growth. This section will address family influences briefly on child emotional development and overall health status, and more extensively on growth. It appears that similar forces exert themselves in all three areas since emotional or physical health cannot be considered fully when separated.

The quality of parent-child interaction plays an important role in a child's emotional development (Agrawal and Saksena 1977) with the parents' attitudes affecting the child's growth through

the type of emotional atmosphere produced (Falender and Mehrabian 1980). Child-rearing practices, child-rearing attitudes, and parental personality all affect the emotional development of the child (Agrawal and Saksena 1977). Silcock (1979) comments that in the family's inner social system "variations in both the quality and quantity of mother-child and father-child interactions would be expected as a result of changes in daily life experiences and ongoing relationships, tension between parents or prolonged anxiety." Lack of family functioning increases the incidence of psychological disturbances in children. Both intra- and extra-familial relationships and supports are important to family quality. The support resources available to a family determine whether that family interprets an events as a crisis (Steger and Kotler 1979). Mothers with greater social support provide more environmental stimulation for their children than those mothers with less support (Pascoe and Earp 1984). Vaughn and co-workers (1979) provide an example of how external forces affecting family environment influence parent-child interactions. Maternal attachment was measured longitudinally in 100 babies of low income families at 12 and 18 months of age. Those mothers who had children switch from secure to anxious reported more stressful life events for the intervening period than the mothers who had stable secure children.

Social-behavioral literature on the family as related to overall health has viewed the family as a principle component in

the etiology of physical and mental illness as well as a factor in its treatment (Litman 1974). Apley (1973) comments on child psychosomatic illnesses that "the child is a barometer of the family emotional climate." He further discusses that mainfestation of psychosomatic disorders depends upon the person's vulnerability and previously conditioned learning, both of which are influenced by family environment. Illnesses not usually considered psychosomatic possess a family component. Situations and supports which affect the nuturing environment change the child's likelihood of illness. For example, Boyce and co-workers (1977) find that the number of life events is directly and significantly related to duration and severity of respiratory diseases in children one to eleven years old. In families with children one to four a direct relationship ($r=\emptyset.18$) is seen between the number of family life events and increased incidence of hospital and physician visits for numerous childhood illnesses (Beautrais, Fergusson and Shannon 1982). This increased morbidity occurred with home accidents, respiratory and gastrointestinal illnesses. This association was independent of mother's education, age and ethnicity, family size, child birth order and family living standards.

Turning to growth related abnormalities and family environment some observers hold that

> the major nutritional problems, those of underfeeding and deficiency disease, are strongly related to problems in the interactive relationship between infants and parents, which in turn are related to economic, social and

psychologic characteristics of the family as a whole (Kallen and Seagull 1977).

As far back as the 194Ø's observations are recorded of children who receiving inadequate emotional care failed to gain appropriate height or weight when sufficient calories were ingested for growth. Fried (195Ø) documented the growth and socioeconomic changes in young clients of a children's home who came from unhappy family situations. Graphing the physical and socioemotional progress of these children showed that these changes paralleled each other. No increase in weight occurred until the emotional state was treated and recovering even though food intake was monitored and nutritional supplements were given for extended periods. These findings support a relationship between "such none (sic) physical factors as emotions on the supposedly purely physical process of growth" (Fried 195Ø).

Situational stresses within a family affect the feeding situation and weight gain. In families exhibiting maternal deprivation syndrome environmental stress causes the mother to react negatively toward the infant and the quality of feedings decompensate (Gray et al 1977). Kristiansson and Fällström (1981) studied 81 infants with clinically low rates of weight gain (2 SD below mean) compared to infants with low but normal weight gain (less than 2 SD below mean) and a control group. A significant relationship appeared between the psychosocial score of the family (increased ill health, unemployment, financial troubles) and the

lowest rate of weight gain ($r = 0.36$, $p \leq 0.01$). However, measures of attained growth showed no relationship with the family score. This study supports the notion that infants with very low weight gain have increased negative family psychosocial forces at play such as those seen in failure to thrive children.

Especially in childhood obesity, the family system is important in the creation of a child's food habits (Hertzler 1981). The youngster's weight may be viewed as a "homeostatic function" of family function and health, and treating the obesity by concentrating on the child will continue the idea that the child alone is the cause of the weight problem (Dietz 1981). Various studies indicate that obesity has genetic familial tendencies (Charney et al 1976) while others report very low correlations (Eid 1970) and that a "common family environment" may be at play to shape feeding patterns (Hawk 1979). The family's social and emotional environment appears to exert as great or greater an influence upon the development of body fatness than does the infant's genetic make up (Hawk 1979, Weil 1977). A review of family life and nutrition reveals that food habits are influenced by many family parameters, not only standard demographic items such as educational level and income but by family structure, parent-child interaction, marital satisfaction, shared activities, and consensus on child-rearing practices (Hertzler and Vaughan 1979).

One area of focus in family environment centers on what factors are responsible for some families to overfeed infants.

Some parents misperceive the infant's needs and interpret all requests as the desire for food (Bruch 1970, Dwyer and Mayer 1973). Food may be used as a pacifier (Dwyer and Mayer 1973), and observations show that more parents of families with minimal cohesion respond with food for all infant needs than do families showing greater cohesion (Hertzler 1981). A child in later years may associate relief of tension with eating even though he/she may not feel hungry (Weil 1977, Hertzler 1981). The early growing years are very susceptible for learning poor feeding habits since the child is developing a sense of hunger and satiety and the ability to distinguish these feelings. Therefore, the longer a child is in an environment that places him/her at risk for learning incorrect behaviors the more likely those behaviors will remain fixed in later years (Edelman and Maller 1981).

Certain personality characteristics present in the mother may increase the probability of her giving excess food to the infant (Dwyer and Mayer 1973; Huenemann 1974). Depending upon the mother's influence, the type and amount of mother-child interaction affects the "functional significance" of mealtime where food and eating may or may not be the central focus (Lipps Birch et al 1981). Lipps Birch and co-workers (1981) looked at the interaction differences between mothers of overfat and slim children four to seven years old in both food and non-food related lab situations. Mothers of fatter children spoke less with their children and were not as interactive.

Besides personality factors of the caretaker, social and environmental conditions of the family may reflect on the child's weight. In a pre-pilot study Voorhoeve, Hoffmans and DeGraaf (1978) examined 32 fat families and a comparable set of controls. A family was classified as fat if a toddler between three and five and one other member were beyond specified normal weight for height criteria. Observations revealed that the size and contact frequency of social support network as well as family vacation time were significantly decreased in the fat families. Also, they noted that several fat families experienced unusual and higher numbers of emotionally difficult conditions (illness, unemployment, divorce) as compared to controls.

Family environment can be asserted to have a significant effect on physical growth in infancy and childhood. Which factors play this important role still are not fully defined. In the present study three aspects of family environment are surveyed for their possible contribution to infant growth. Family stress and maternal social support may influence the feeding situation. The child enters the family as an interactive component among these environmental forces and uniquely responds according to individual personality. The following section examines how stress, social support and personality may act in concert regarding overall family health.

## Relationship of Health Outcome to Stress, Social Support, and Temperament

The relationship of stress to physical and emotional illness has been recognized for many years. Relationships between life stress and major and minor illnesses as well as their severity of outcome has been thoroughly reviewed (e.g. Rabkin and Struening 1976, Sarason, Johnson and Siegal 1978). Major emphasis has been placed on stress as an environmental or social factor of major importance in disease until the past decade. Since then the intrinsic factor of temperament or personality and the external factor of social support for the individual or family have gained status as substantial contributors to the susceptibility and initiation of substandard health.

This section will briefly outline the four major theories which, in the author's opinion, attempt to explain the general relationship of stress and disease. A discussion will follow this summary on the reasoning behind the recent direction in stress perception research to include social support and temperament in the model in order to more fully explain health outcome under stress. This three-pronged model of stressor, support, and temperament on health provides the basis for this project examining the impact of family environment on child growth patterns. For the family or mother social support plays an important role in maintaining stability in the child's developing atmosphere. Social support of the major caretaker, the mother, may buffer the impact that an event could have on the family's social/emotional

atmosphere. The child's basic personality or temperament provides strength or weakness in his or her reaction to stress, as it influences the family environment which in turn reacts towards the child. The basic temperaments of a young child may either protect or sensitize him or her to perceiving a stressful family environment. Weight gain out of the norm for a particular age may be viewed as the symptom of abnormal growth, the condition under study in this project. Although most research to date relates stress to mental illness and physical diseases other than weight aberrations, the basic relationships found in these studies may be applied to weight gain problems.

**Life Stress**

Cannon (1929) initiated research on stress and disease with his observations of the changes in physiology related to displays of the major emotions. The result was an "organic preparation for fighting" with changes in hormones, blood sugar levels, and cardiovascular rates.

Meyer's development of the life chart in the 1930's further connected life events to stress and physical illness (1951). Events occurring to the patient and his/her "disorders" would be mapped on one time line. Over this the patient's subjective reactions would be placed. Associations between the timing of events and subsequent illnesses could then be visualized. Dohrenwend and Dohrenwend (1974a) point out that Meyer believed "life

events. . .need not be bizarre or catastrophic to be pathogenic" but that the reaction toward the occurrence was important.

The 1950's brought Selye's (1956) description of stress and the generalized adaptation syndrome (G.A.S.). Purely a biological reaction, the G.A.S. changes that occurred under stress were physiologically specific but were produced non-specifically by any stressor. As with Cannon, hormonal and metabolic states shifted in specified directions. Selye's definition and proposed mechanism of stress-induced illness has remained one of the most widely referenced concepts in stress.

In relation to family dynamics Hill's "ABCX model" has been the standard perception of stress unaltered for thirty years (McCubbin et al 1980). Hill's theory is summarized as: "A (the event) --> interacting with B (the family's crisis-meeting resources) --> interacting with C (the definition the family makes of the event) --> produces X (the crisis)" (Hill, 1958, p. 141). Observations to investigate and create this model were conducted on families forced into separation during World War II. Hill notes that each family group is individual in its manner of reacting toward a situation through its perception of the event's severity. A crisis or stress is not produced automatically by the intrinsic properties of the event but it is evaluated by the family unit as a whole.

**The Link**

Life events explain only a small percentage of the variance seen in illness onset. Lin and co-workers (1979) states that since the explanatory power of life events is low, only by exploring other variables related to disease etiology will greater predictive accuracy occur. Dohrenwend and Dohrenwend (1974b) partition those variables which interact with stress on physical disease into numerous "processes". Pearlin et al (1981) researching stress effects on depression also emphasize that stress is a dynamic process, a combination of (1) stressors, (2) support, and (3) coping behavior, all resulting in continued well being or disease.

Reviews and research in life events discuss the relationship between stressors, support, and personality either as a side comment (Tausig 1982) or a primary focus (Rabkin and Struening 1976, Cobb 1974, McCubbin et al 1980). These factors have a "cumulative impact" and "reciprocal" interaction among themselves and on stress perception (Rabkin and Struening 1976). Cobb (1974) diagrams his metatheoretical model to show that "personal characteristics" and "social situation" mediate the effects of a life event. This either provides "immunity or susceptibility" towards stress. McCubbin and co-workers (1980) focusing on family stress report that this field of research currently is attempting to characterize those situations, supportive resources, and behaviors which help to sustain families under stress.

The three factors in this model will be further defined to illustrate their relationship to well being and disease.

**Stressors.** Pearlin and associates (1981) broaden the theory surrounding life events by delineating the characteristics of events they view to be causal of stress. Events may be singular incidents in time or "chronic strains" of longer duration. This dichotomy "suggests that events do not necessarily impact upon people directly but may, instead, exert their effects through a wider context of life strains. Thus the two major sources of stress. . .may converge in the production of stress." Rutter's (1981) examination of stressful events on child psychiatric manifestations confirms Pearlin and co-workers' supposition. As the number of risk factors or chronic strains associated with a child increases then the incidence of psychiatric problems rises. They report that multiple life stresses occurring together interact with each other producing a greater effect than simply adding the effects of each chronic risk factor separately. This interaction also is extended to the effect of multiple acute stresses such as numerous hospital admissions for physical ills on later demonstration of psychiatric symptoms.

The impact of events upon the individual must be evaluated carefully within the context of the situation (Eckenrode and Gore 1981). As Eckenrode and Gore perceive the development of life events research, a particular type of event was initially viewed as having the same effect on all subjects and that the surrounding circumstances and other events occurring along with the event in

question did not change the stress level induced by the particular event. This view of life events has changed. The authors point out that each person views the result of an event in a unique manner. Therefore, the significance of the occurrence must be individually assessed rather than assuming that the meaning of an event is due to its own characteristics.

Social support. Even more diverse than stressors, the definition of social support varies (Pearlin et al, 1981). The most "comprehensive" (Broadhead et al, 1983) of these descriptions is that proposed by Kahn (1978):

> We propose that social support be defined as interpersonal transactions that include one or more of the following: the expression of positive affect of one person toward another; the affirmation or endorsement of another person's behaviors, perceptions, or expressed views; the giving of symbolic or material aid to another. The key elements in supportive transactions are thus affect, affirmation, and aid (p. 85).

Physical and mental diseases which are noninfectious appear to be most susceptible to changes in social support (Pilisuk and Froland 1978). Examples given by Pilisuk and Froland include accidents, alcoholism, cancer, depression, and heart diseases. The progression of disease, they view, begins with an individual at risk because of a genetic history or previous contact with the disease "agents." The person's susceptibility is due to his or her intrinsic nature. Health will decompensate then when exposure to environmental stressors increases. However, the researchers emphasize, in the presence of a "cohesive" social support system the disease symptoms may not manifest themselves.

Those characteristics of social support networks which are most protective of health appear to be the quality of the social relationships rather than the quantitative aspects (Broadhead et al 1983, Pearlin et al 1981). The size of the network and the frequency of contact appear not to mediate stressful events as well as the quality of emotional and physical aid exert. For some populations, as depression in women, physical aid may not be as successful in protecting them from ill health as emotional support gives to health maintainance (Brown, Bhrolchain and Harris 1975). Therefore, type of aid, emotional or physical, must be figured into the equation of disease factors.

Hammer, Gutwirth and Phillips (1982) compared the social networks of parents to adults without children and found both qualitative and quantitative differences. Mothers of young children substantially increase the number of their kin and friendship ties and decrease work related contacts. The total size of network remains similar to childless women except for non-working mothers in low social class who have an absolute reduction in network size. Fathers tend to have a few more kinship ties but for the most part keep their networks unchanged. Those mothers who work at least part-time greatly increase their network size and diversity compared to non-working mothers. Frequency of contact is lowest for non-working mothers while working mothers maintain a similar level as that of childless women. The researchers do not evaluate the emotional or physical stability of these different groups of adults in their study but point out that

the network diversity and frequency of contact for mothers has been demonstrated in previous studies to contribute to a "sense of well-being." Hammer and co-workers do not evaluate network qualitative differences between sets of parents in relation to their health outcome but only describe the quantitative changes which occur in the network when children are introduced to the system. Their speculations on health effects through network size and contact disallows the tendency to de-emphasize these quantitative properties as the comments by Broadhead et al (1983) and Pearlin et al (1981) project. Both types of data on social support networks can contribute to stressor-illness outcome.

Temperament. Coping behavior is classified as a mediating resource for the adaptation to stress (Pearlin et al 1981). As Pearlin's group defines it, a mediating resource can be called upon by people as a form of defense against the degenerative effects of stressors. They view coping behaviors as situation specific actions which perform one of three functions: (1) changing the environment to decrease stress, (2) changing the perceived amount of stress coming from an event, or (3) ameliorating the physical or mental symptoms of stress. Rutter (1981) details those characteristics unique to each child which influence his or her ability to cope with stressors: age or stage of development, sex (apparently pre-pubertal girls are more resistant to stress psychologically), genetic factors (parental history of psychological health), intelligence, and temperament. Although few documented observations of temperament on stress perception in

children present themselves, Rutter believes that different temperaments will effect the parents' response toward the child and therefore place the youngster under protection from or at risk for stress outcomes in the family.

Two constructs of child temperament have served as the cornerstones of measurement scales currently used (Hubert et al 1982). The two theories have similarities yet differ substantially. Buss and Plomin's (1975) model is "interactive," that is, environmental forces influence temperament development and temperament elicits responses from the social surroundings. Five criteria must exist for a specific temperament to be defined: (1) genetic component, (2) stability of general behavior through childhood, (3) continued disposition into adult life, (4) adaptive value for psychological (and physical) survival, and (5) presence in animals. Above all, there must be a stability present in the trait throughout development. Four temperaments arise from these criteria: activity, emotionality, sociability, and impulsivity, and a child is classified by the various degrees of each temperament he or she demonstrates.

The theory resulting from the New York Longitudinal Survey (Thomas, Chess and Birch 1968) sharply contrasts with Buss and Plomin by espousing that change may occur in temperaments as children mature. Similarity exists between the two constructs in that the NYLS researchers also describe child development as interactive. They describe children using nine characteristics: activity level, rhythmicity, approachability, adaptability,

intensity of reaction, threshold of responsiveness, mood, distractibility, and persistence. Combinations of these characteristics produce three behavioral "styles": difficult, easy, and slow-to-warm-up (Thomas, Chess and Birch 1968). Those children who do not fit into these tightly defined categories are classified as intermediate high or intermediate low (closer or further from the difficult temperament) when using measurement scales grounded in the NYLS theory (McDevitt and Carey 1978).

The "functional meaning" of a specific environment or event will be different for children from each behavioral style (Thomas, Chess and Birch 1970). Temperament influences the manner in which an event is interpreted. Above all, the subjective meaning of an event rather than the objective aspects has the greatest control on an individual's reaction to that event (Antonovsky 1974). Therefore, not only the characteristics of an event create a response from the child, but his or her developmental age and personality via coping skills make that response unique (Pinkerton 1974).

Within the last ten years concerted efforts have been made by some observers to detail in children under severe environmental duress those personal characteristics and social influences which make some of them psychopathologically "invincible" (Werner and Smith 1982, Rutter 1981). One of the most extensive surveys is a study of an Hawaiian cohort of children born in 1955 and monitored for twenty years searching for indicators of vulnerability or resilience toward coping disorders (Werner and Smith 1982). These

children experienced parental mental and physical diseases, poverty or perinatal stress, and usually a combination of larges stressors. Salient findings on the stress resistant infant under one year of age were that the child was usually first born and was described by the parents as active and very responsive socially. The combination of these two characteristics allowed the child to command large amounts of favorable attention from the parents. Toddlers up to two years of age were most resilient to coping problems when demonstrating independent personalities and ease with social interactions.

The three-pronged model outlined at the beginning of this discussion has initiated a more comprehensive approach toward studying the consequences of stress on health in the last decade. Physically and mentally individuals are the product of their environment and personal attributes. Children are equally if not more malleable in response to environmental stimuli than adults. Accurately measuring these three forces--stressors, supports, and temperament--is difficult using presently developed methods. The next section details the primary methodologic problems of these currently available tools.

## Methodologic Concerns Regarding Scales of Life Events, Support, and Temperament

All three variables in this stress model, family life events, maternal social support, and child temperament, currently

are measured by various scales. Numerous methodologic concerns arise when considering the reliability and validity of these scales.

**Life Events**

The Holmes and Rahe (1967) Social Readjustment Rating Scale, SRRS, was the springboard for the rapidly expanding generation of life event scales to come in the following years. Holmes and Rahe's primary goal was to measure the amount of readjustment necessary for people to recover from various life-style changes. The basic assumption was that the greater the incidence of life events in a discrete period of time, especially those events requiring large amounts of readjustment, then the more likely the onset of illness due to increased stress (Holmes and Rahe 1967).

Following the SRRS new scales and scaling methods were developed by others in response to the shortcomings they noted in the original tool. Representative samples include those scales written by Cochrane and Robertson (1973), Coddington (1972), Dohrenwend and co-workers (1978), Hough, Fairbank and Garcia (1976), Paykel, Prusoff and Uhlenhuth (1971), Rahe, Ryman and Ward (1980), Ross and Mirowsky (1979), and Sarason, Johnson and Siegal (1978). They relate life events to onset of either physical or psychosocial illness. These newer tools and printed comments attempt to resolve numerous conflicts regarding the appropriate use of life events as a measure of stress. Issues revolve around

1) calculating scores of events by desirability versus readjustment, 2) impact weighting of events versus non-weighting (simple count), 3) validity-predictability by life events of physical or psychological illness, 4) grouping effects of negative and positive aspects within single life events, 5) cultural influences on perceived stress, and 6) the sample of events required to fully indicate overall stress.

One of two issues under continuous debate in life event research is whether to calculate life event scores by selecting events according to their desirability (usually negative) or by the absolute readjustment necessary for lifestyle to return to normal (both positive and negative impacts). Holmes and Rahe (1967) originally defined social readjustment as the amount of effort required to cope with an event "regardless of [its] desirability." Therefore, a positive, desirable event that changes the "accustomed pattern" of life is assumed to exert an equal amount of stress on an individual as a negative or undesirable event. Other scales besides the SRRS also rank life events according to readjustment in lifestyle (Coddington 1972; Dohrenwend et al 1978; Hough, Fairbank and Garcia 1976). Scales based on desirability, however, rate life events according to the amount of turmoil or negative influence exerted, and these authors (e.g. Cochrane and Robertson 1973, Paykel, Prusoff and Uhlenhuth 1971, Sarason, Johnson and Siegal 1978) emphasize that undesirable events have greater detrimental effects upon physical and mental health than positive events.

Zeiss (1980) reexamined Holmes and Rahe's readjustment scale to determine if it truly measured absolute change in life as they claimed or quantified aversiveness. Subjects rated the unpleasantness of the original Holmes and Rahe 43 life events. These scores were significantly correlated ($r=0.69$, $p \leq 0.001$) to the calculated life change units (LCU) weights published in 1973. The author concluded that the LCU reflects the undesirability of an events and is not just a measure of adaptation. Beyond Zeiss's evaluation, studies (e.g. Gertsten et al 1974, Ross and Mirowsky 1979, Tausig 1982) support the dichotomy between positive and negative events by demonstrating that undesirable events are associated most highly with psychological and behavioral disturbances. Ross and Mirowsky (1979) show that Holmes and Rahe's scale is correlated 0.80 - 0.84 with undesirability of events.

The second major undecided aspect in life events research concerns whether to calculate stress by simply counting the incidence of all events with equal weight assigned to each event or to compute a score by hierarchically ranking events according to the amount of perceived stress each one would generate and summating those weighted events. Holmes and Rahe (1967) defined the life change unit by arbitrarily giving marriage 500 points, and this event became the modulus for comparing all other events. Participants rated events by delegating greater or fewer point to a particular event for its life change capacity in relation to that amount of change resulting from marriage.

Dohrenwend and co-workers (1978) and Hurst, Jenkins and Rose (1978) conclude that weighting events provides an advantage in relating stress to illness. Theorell (1974) found that heavily weighted LCU events had a higher correlation with coronary heart disease onset in patients compared to control subjects than did counting those events and assigned them all equal impacts. Rahe (1974) suggested that in a sample of young Navy men experiencing low to moderate LCU events a simple unit scale was equivalent to weighted events. Yet, for middle age men weighted scales were preferred since this population more frequently encountered higher weighted events.

Other comparative studies conclude that differential weighting of life events yields a similar score to the absolute count of events occurring in one period (Ross and Mirowsky 1979, Skinner and Lei 1980). Ross and Mirowsky (1979) compared 23 different weighting "schemes" to calculate a measure of stress and correlated these to psychiatric disturbances in 720 households. Simply counting undesirable events led to the highest correlation. Skinner and Lei (1980) administered the Holmes and Rahe Schedule of Recent Events, SRE, (simple count) to 353 alcohol and/or drug abuse clients. These composite scores were compared with those scores assigned SRRS differential weights. Their unit weighted SRE scores correlated 0.97 with the differential weighted sums. Therefore, the authors express, the two methods are equivalent. Skinner and Lei advocate the use of the simplest scoring method until greater evidence proves otherwise.

A third issue in life events research surrounds evidence from 1967 to 1983 which overwhelmingly suggests that the predictability by life events of physical or psychological disorders by life events is quite poor. Holmes and Rahe (1967) admitted that although life events play a part in disease etiology, they are not a "sufficient" or major causal agent of illness. Rabkin and Streuning's review (1976) reported a paucity of event-illness correlation studies, and those figures that were present in the literature were never higher than Ø.3Ø. Therefore, life events generally explained less than 9 percent of the variance in the occurence of disease (Rabkin and Streuning 1976). Three more recent studies (Horowitz et al 1977, Ross and Mirowsky 1979, Tausig 1982) similarly report their highest correlation coefficients for psychiatric or depressive symptoms as Ø.18, Ø.19, and Ø.21, respectively. When utilizing life event surveys as a tool for predicting illness the user must realize that up until the present the modes by which to administer past surveys and/or their analyses of data have led to small event-symptom correlations. Any further studies will result in equally low outcomes unless different testing/scoring techniques are developed.

Substantial data exist regarding the benefit of separating the positive and negative aspects of a single type of event. These calculations disprove Holmes and Rahe's notion that combining the positive and negative sides of an event is harmless. For example, numerous items in the SRRS (Holmes and Rahe 1967) appear to be generally described as neither positive or negative, such as

"change in financial state," "change to different line of work," and "change in living conditions." Sarason, Johnson, and Siegal (1978) and others disagree over the reasoning for this combination. They assert that undesirable events have greater impact upon decompensated health than positive changes exert. When comparing the mean weights of clearly undesirable, ambiguous, and desirable events in the Holmes and Rahe list, researchers find that by far undesirable events are weighted highest (Ross and Mirowsky 1979). They conclude that greater readjustment is needed for these negative items. Hough, Fairbank and Garcia (1976) divided Holmes and Rahe's ambiguous events into positive and negative items. Subject rankings of these divided events clearly showed the negative aspect as carrying more impact. They conclude that combinations of items "decrease the accuracy of prediction."

Even if stress could be accurately measured cultural perceptions of life may produce different rates among certain groups of people. An event may be designated positive or negative depending upon the particular culture's view (Hough, Fairbank and Garcia 1976). Therefore a standard weighting scale may not be appropriate for all populations. Initially the SRRS was assumed to be culturally free since examination of results failed to show differences due to race or social class (Holmes and Rahe 1967). However, the subjects used to rate the SRRS were composed of a sample of convenience, 363 being Anglo and only 31 Negro or oriental. Askenasy, Dohrenwend and Dohrenwend (1977) dispute the use of samples of convenience because they often do not properly

represent the ethnic variability in a given population and frequently many in the sample come from the same social networks and share similar views on life. These authors surveyed a mixed population of urban black, Puerto Rican, and non-Puerto Rican whites from four social classes indicated by educational level. Correlations revealed substantial ethnic and social class differences in life event ratings. Hough, Fairbank and Garcia (1976) scanned the literature for life event studies of different ethnic groups. They found that Mexican-American compared to Anglo life event ratings correlated Ø.7Ø to Ø.77 whereas ratings between two Anglo cultures topped Ø.9Ø. With their own Mexican American and Anglo population Hough and co-workers compared ratings according to the class of event (e.g. family, work). Not only did Mexican Americans generally assign higher scores to events, they appeared also to consider events in certain areas as more stressful and some areas as less stressful that Anglos reported. As far back as 1969 Komaroff, Masuda and Holmes documented that ethnic groups significantly differed in assigning weights, yet they asserted that the ranking or hierarchy of events remained similar. Today the general recommendation to avoid "sociocultural parochialism" (Dohrenwend et al 1978) is to choose from among the population to be tested a sample to initially rate the perceived weight of life events and use this group specific scale for correlations with disease symptoms.

Finally, another longstanding question posed in life event surveys regards the sample of events required to fully indicate

overall stress in the subject. Many authors question the scope of Holmes and Rahe's (1967) list of 43 items claiming it does not cover a broad enough sample of events to accurately predict symptoms. A majority of items overlap in the numerous lists generated since the original survey, yet each has unique items. Ross and Mirowsky (1979) used two lists of events, one being a subset of the other, to correlate with psychiatric symptoms. Both lists generated different levels of prediction adding more weight to the thought that the events list used will influence the outcome (Dohrenwend 1974b). Tausig (1982) counters this point by asserting that different lists "provide only a marginal substantive improvement in the relationship of the scale to a dependent variable." He points out that in comparing correlation coefficients only slight numerical differences exist between smaller and expanded lists of events when predicting disease symptoms.

McCubbin and co-workers (1980) conclude that progress in family stress research will occur only after a "system for describing, measuring, and evaluating stressors which impact on family life" is designed more precisely. At that time reliability and validity data for life event measures will become more acceptable and these scales will possess higher predictive powers.

**Social Support**

Highlighted in most research on social support is the predicament that an overall definition of the concept has not reached consensus. Numerous descriptions have been proposed, no doubt since social support is viewed by many as a "multidimensional concept" (Thoits 1982). Inadequate and variable definitions therefore result in the inability to identify what features of social support mediate stressful impacts and the measurement of these components according to Thoits. The content of a social support scale and the data resulting from its use are directly affected by the definition accepted by the scientist (Broadhead et al 1983).

Besides lack of agreement on its definition and operationalization, the interpretation and methodology of social support measurement is confounded by life events. Thoits' (1982) discussion of this problem in support research clarifies the direct and indirect effects of life events on support ratings and the influence of social support on the occurence of life events. Certain life events involve or may cause changes in social support by changing the environment. Thoits gives examples of life events as divorce, marriage, trouble with co-workers or even change in income which could influence the possibility of making social contacts. Therefore a person's social network is the "product" of previous life events. Thoits continues by describing the effect an individual's support network has on possible life event

occurrences. If the level of social support is adequate undesirable events may not occur. An example is her citation of a person releasing tension at work through a co-worker rather than arguing with a superior and losing the job. This confounding of life events and social supports does not allow a clear display of the relationship between the two components.

Refining the assessment of social support promises greater strides in advancing the relationship of stress-support-ill health, according to Dean and Lin (1977). Their review of scales through 1975 concluded that no social support scales with adequate reliability and validity were available at that time and development of such a measure would prove difficult. Thoits followed in 1982 with additional arguments that the evaluation of social support is not accurate. Social support research needs an agreed upon set of measures to include in all scales as determined by a universal definition. Elimination of the confounding by life events will occur when longitudinal data is collected simultaneously on life events and social support to determine the relationship between the two forces (Thoits 1982).

### Temperament

Accurate measurement of any parameter requires that the trait be fully defined, stable, and minimally influenced by the

mode of measurement. Early childhood temperament to date fails on all three prerequesites for precise measurement.

As with social support, a basic dilemma in child temperament research is the development of a theoretical definition of temperament. Heretofore definitions have been formulated operationally, that is as traits which can be measured by behavioral instruments (Hubert et al 1982). As Carey (1983) writes, temperament is a "behavioral style, or the 'how' of behavior, rather than as the content of behavior, or capacities, or motivations." This definition presents the problem that several varieties of scales have been developed to assess different operationalizations of temperament. No consensus has been made on one specific definition. The 26 scales for infant, preschool or school-age children reviewed by Hubert and associates (1982) measure different aspects of temperament, each scale overlapping characteristics of others but not permitting one scale to be fully compared with another. Which operational definition to choose from is a major question when selecting a temperament scale. The basic assumptions of each definition regarding temperament are different and determine which traits will be measured.

Controversy still remains whether temperament during infancy and early childhood is a stable parameter or modified with time and environmental influence (Hubert et al 1982). One of the first groups to longitudinally study child temperament, the New York Longitudinal Study (NYLS) (Thomas, Chess, and Birch 1968), hypothesized that a child's traits constantly are modified by the

environment. This proposal still holds much weight today. In contrast Buss and Plomin (1975) theorize that temperament is generally stable through time. Interpretation of scale test-retest reliabilities depends upon which view of temperament is applied. As Hubert and co-workers (1982) discuss, most scales have low to moderate reliabilities and these scores either may indicate poor test construction or may support the NYLS theory. Low reliabilities could reflect the instability of temperament over time as proposed by Thomas and associates. Carey and McDevitt (1978) examined the stability of temperament diagnostic clusters in 187 children from 4 to 8 month olds and again when they were 3 to 7 years of age. Results indicated a tendency for children at the extremes of temperament to change to moderate ratings and few drastic jumps to occur in any character.

Two of the three most commonly used temperament assessment methods utilize parents as the source of information (Carey 1983). Unfortunately parents may yield a distorted view of the child by giving their own impressions or expectations of the child rather than true characteristics. Mothers can misinterpret their infant's reactions when there is a disturbance in mother-child relations (Carey 1970). If the topic is emotionally sensitive or retrospective then parents are more likely to distort their reports (Anon 1982). Two studies (Crockenberg and Acredolo 1983, Sameroff, Seifer and Elias 1982) reveal that the mother's description of her child's temperament is highly related to her behavior. Mother behavior "variables" were shown to have higher predictive

powers on later child temperament scores than early child behavioral "variables" (Sameroff, Seifer and Elias 1982). Other studies produce opposite effects on parental distortions of temperaments. Lyon and Plomin (1981) tested for parental "projection" of their own personalities on their 2-6 year old children's reports and found no evidence for this proposal.

In summary, Hubert and associates (1982) conclude that "no single psychometrically sound and adequately validated measure of early temperament is currently available. . .based on findings related to test-retest reliability, interparent and parent-observer convergent validity, concurrent validity, and factor congruence." Use of these scales must be tempered with the realization that ratings will measure not only the child's temperament but parental influences (Sameroff, Seifer and Elias 1982).

## Clinical Use of Family Assessment in Child Health

Finally, a brief look at current medical useage of family assessment reveals a growing physician interest in the impact of family environment on individual well-being. Within the last five to ten years advocates for the family have voiced concern that the physician should increasingly view the family as the patient and not just treat the individual in the context of family but treat all members as a unit (Arbogast, Scratton and Krick 1978, Geyman 1977). Shapiro (1981) urges that a new approach to family medicine must therefore follow through in the format of patient charts

already taught for general use by all physician's but modified towards a family approach. He suggests that all records for one family be retained together and that summaries of a family's resources, structure and events be recorded.

Various clinical models exist in family medicine for the psychophysical exam of families. Medalie's Family Epidemiologic Model (Rakel 1984) parallels the approach used in this present study. Three factors interacting on and within the family are viewed as intersecting circles used in the traditional epidemiologic model. "Host" includes the family with its innate strengths and weaknesses. "Environment" is the family's cultural, physical and social surroundings. "Agent" encompasses all diseases, life events or other stressors for the family. These three factors yield a product of "resultant adjustment" for the family as it copes with the environment.

Screening tools of the environment for the child patient require modifications of the adult version. One that has been developed (Metz et al 1976) includes all components of the theory used in this study. The child's behavior and the parents' perception of the child, family stress events and supports available to the caretaker are assessed. Although it focuses primarily on emotional and learning problems in children it may serve as a model to be tailored to examine a child's physical state.

Rakel's (1984) discussion of infant nutrition provides impetus for doctors to consider family environment in the course of children's growth abnormalities. He cautions physicians not to

forget family relationships and other family psychosocial stresses when diagnosing infant feeding problems for the child's feeding status may reflect underlying family stresses.

## SUBJECTS AND METHODS

### Subjects

The children and their families were drawn from Harrison's longitudinal growth study, "Perinatal Predictors of Infant Obesity." This study included approximately 300 families participating, for a three-year period or less, during the years 1977 to 1983. All were residents of Tucson, primarily Caucasian and Mexican American with some American Indian, oriental, and black families. The singleton infants were born from uncomplicated pregnancies, were equally represented in both sexes, and were clinically healthy at term. No premature infants were accepted. Multiple anthropometric measurements were taken on the infant and mother at birth and every six months thereafter (± two weeks) until the child was three. Interviews with the caretakers were conducted at those times to survey the child's eating behavior, family attitudes toward body weight and eating, and family demographic changes.

Noticeable attrition rates between the various measurement encounters were present throughout the entire study period. Concerted efforts were expended to follow all subjects. Generally, relative's and friend's names and addresses were collected at the

initial interview so that families might be traced who had relocated at the time of a follow up visit. Each family was contacted two weeks before the child's six-month birthday to arrange for that home interview. Attempts were made through support networks to reach those families who were not contacted by the first calls; these efforts continued until two weeks after the birthday. Those famlies not found had either relocated and could not be reached through relatives or had remained at the same address but had their phones disconnected or unlisted at the time of measurement. The easiest families to contact consecutively were those with large support networks and/or who were stable and financially secure. Therefore, families which completed the study with few missing data points were biased in terms of their support network size or financial stability.

For this study 83 mothers (for 84 children) were reinterviewed one additional time to assess the family environments as they were for the children when they were under three years of age. From the entire pool of families in the longitudinal surveys 124 infants qualified for this project. The minimum requirement selected for these children was to be able to follow growth changes over a two year continuous period. This restriction biased the study sample by demanding certain characteristics in the selected families that guaranteed stability in follow up during the longitudinal study and for renewed contact years later for this current study. Either the 83 families had support contact members available to relocate them after moving or the

families were stable in location and earned steady incomes sufficient to maintain a phone. Infants had to have been measured at least five consecutive times to result in four six-month growth change periods. Out of seven total measures possible (Ø, 6, 12, 18, 24, 3Ø, 36 months) a child could have missed up to two appointments during the three year study. Of the 124 potential children 4Ø families either declined participation, approximately ten, or were no longer at their last recorded address, many of which had no support member contacts listed for follow up. Letters of introduction were sent to parents before phone contacts were made to explain more about the study and obtain permission to interview them in their homes.

## Data Collection

The questionnaire was developed using published rating scales with some modifications in order to evaluate previous rather than current family environment and child temperament. Three parameters were measured: (1) the child's present and past temperament, (2) the major caretaker's (mother's) personal support system when the child was under age three through family, friends, and relatives, and (3) a listing of the major life events occurring in the family when the child was under three. Refer to Appendix A for a copy of the interview form.

Current child temperament was assessed using the Behavioral Style Questionnaire (BSQ) for 3 to 7 year olds developed by

S.C. McDevitt and W.B. Carey (1978). This scale consists of 100 statements with a six-response reply by the caretaker regarding frequency of age appropriate behaviors of young children. The BSQ has test-retest and alpha reliabilities for trait measuring consistency of 0.89 and 0.84, respectively (McDevitt and Carey 1978). It is one of the most reliable instruments currently available as well as possessing adequate internal consistency (Hubert et al 1982). Temperament scales evaluate present behavior. Therefore, to classify a child's temperament when under three years of age an additional section to the BSQ was created comparing the child's present to past behavior according to each of the nine behavioral components or subscales evaluated in the McDevitt and Carey questionnaire. The presence of absence of change in temperament from past to present age was asked of the caretakers to account for the trend noted by the scale authors (Carey and McDevitt 1978) that extreme ratings (easy or difficult) in infancy (4-8 months( may change to more central scores later (3-7 years old). The study children could therefore be categorized according to the five temperament types described by the BSQ (difficult, slow-to-warm-up, easy, intermediate high, intermediate low) and presence or absence of change with the assumption taken that changes in temperament over the years by children were to more central scores that what they would have rated if tested when under three years of age.

Mother's social support was measured using a modified Norbeck Social Support Questionnaire, NSSQ (Norbeck, Lindsey and Carrieri 1981), and the Family APGAR Scale (Smilkstein, Ashworth and Montano 1982). Since one of the criticisms in support research is the lack of a unified definition on which to base a scale's content, both the NSSQ and APGAR were used to measure support to see whether the type of scale used would effect the results of correlations between support and growth.

The NSSQ scale measured support network size, types of relationships, frequency of contact, duration of relationships, and affirmation/aid of its members. It consisted of a listing of those people significant in the caretaker's life during the three year period followed by questions regarding support from the listed people. Norbeck's scale was shortened from eight questions to four to reduce the lengthy interview time (pretest average time of two hours) and were rephrased to measure relationships from previous years instead of the current period.

The NSSQ was selected as a combined measure of social support's emotional and physical aid. The Norbeck scale bases its composition on the theoretical definition of Kahn (1978). Of the three part definition, only affirmation and aid were measured. Affirmation was assessed rather than affection because the questions pertaining to affirmation covered how well a person could feel emotionally supported through troubled periods of life while the affection questions covered the degree a person felt loved and

respected. Since the NSSQ was shortened and modified to the past tense, any of the published reliability studies were not applicable to this modified version. Therefore the abbreviated NSSQ scores in this project could not be compared with those derived from other studies using the unabridged scale although it still retained many key elements of the measure's theoretical basis.

The original Family APGAR scale measures family satisfaction in the present. For this study's purpose verb tenses in each of the five statements were modified to the past. Any reliability or validity data therefore was invalid for this version, although the original APGAR yields a score of Ø.86 for Cronbach's alpha of internal consistency and shows a test-retest reliability of Ø.83 (Smilkstein, Ashworth and Montano 1982). The object of each statement was broadened to form six APGAR scores. "Family" was replaced with "husband/partner", "child(ren)", "mother's relatives", "mother's in-laws", and "average relatives". "Friends" were assessed also. A five-response scale was used as recommended by the scale authors for research purposes as opposed to the three-response scale used in clinical settings. Any change in the mother's feelings towards these people during that three year period was noted as a comment.

The third component measured, family life events, was accomplished by asking mothers to recall events that occurred within the family context when the study child was under three. This open-ended discussion covered the major event topic areas

mentioned by Dohrenwend and co-workers (1978) in their PERI Life Events Scale: school, work, love and marriage, having children, family, residence, legal matters, finances, social activities, and health. Childcare was added as another area of interest. A listing of possible events under each category was given to the mother to help prompt and extend her recall. Each event recalled was placed as best as possible in the six-month age period of he child. The caretaker was then asked to rate the event as a change for the better, worse or no change for the child, family, and herself.

Degree of change by event was not assessed by the 83 mothers. The interview's length prohibited further detail other than gathering type of event, time of occurrence and its duration, and desirability. Therefore, 39 other mothers from Tucson were briefly interviewed (under one hour) after the larger sampling was completed in order to obtain a consensus rating of impact generated by each event. See appendix B for interview form. The original hierarchical method by Holmes and Rahe (1967) was not used to rate each event. Instead each mother in this smaller sample indicated for the list of items, which has occurred to the larger sample, whether each event would have had a "large" or "small" impact on her life if it had transpired in her family. A large impact was defined as any event <u>regardless of desirability</u> that would prompt the mother to think about it for a "long" time,

however, she conceptualized time. A "small" impact from an event would cause her to have few thoughts about it.

The 39 mothers were interviewed in their homes and selected by ethnicity to match the larger sampling of primarily Mexican American and Anglo mothers. Approximately equal numbers of each ethnic group were chosen so that cultural differences, if any, could be examined in the distributions of event impact responses. Besides ethnicity, another criterion for selection was that each mother had at least one child under three years of age so that the stage of family development would be similar to that of the larger sample. The subjects were identified through personal contacts of the author and departmental associates. To broaden the opportunity sample each mother interviewed was asked for names of friends and relatives who also had young children. At least six clusters of varying numbers were made from the original sources to amass the 39 mothers. These mothers showed diversity in their apparent income level, education, age, and parity. They ranged from lower to upper income brackets, less than high school graduate to graduate degrees, and one to six children. Their ages ranged from early twenties to mid-thirties. The Mexican American mothers tended to have less education on the average and lower income levels than the Anglo mothers although both ethnic groups ranged over approximately similar values in the two parameters. Almost half (18) of the families had only one

child and a similar number (16) had two children. The remaining families (5) had three to six children.

The life events surveys in both sets of mothers (84 and 39) were designed in response to those currently debated issues mentioned in the literature review. Mothers in the larger sample were asked to categorize events according to desirability so that both total number of events and negative impact events could be sampled in the analysis. This interview was open-ended in order not to restrict events to specified items. In the analysis events of selected impacts then could be sampled by desireability and degree of change. The interviews to standardize the degree of change were administered to Mexican American and Anglo samples so that cultural differences could be checked in event ratings.

In addition to the administration of the four scales in the large family environment survey, background information was obtained to study demographic similarities and differences among the 83 families. Questions on ethnicity of both parents, maximum years of schooling reached while in the longitudinal study, and household composition changes during the three year period were asked. Following each interview aspects about the encounter were noted such as presence or absence of other adult family members during the visit, frequency of interruptions by the child(ren), favorable or unfavorable reaction of the mother towards questions, and her present marital status.

The interview was pretested on eight mothers and one mother-father pair. The two-parent interview was qualitatively different compared to the one-parent interviews in that the degree of sensitive family information the mother gave when in the the husband's presence appeared to hinge upon the couple's marital satisfaction. Each parent in the pair possibly influenced the response of the other simply by his or her presence and may have inhibited certain details coming to light about the family's life. Therefore, to be consistent with the interviews conducted in the longitudinal study and in keeping with the pretest finding, attempts were made to only visit with the mothers. A very small number of interviews were conducted in which the father or another adult was present and the interview procedure was modified so that the married couple filled out the NSSQ and satisfaction scales by themselves rather than responding to the interviewer orally administering those scales. Hopefully, this privacy for the mother encouraged her to be more honest in her replies even though her husband or other adult was present. The life events survey was still discussed openly. Since the survey was reserved as the last item in the interview, this author hoped that good rapport would be established between the mother and the interviewer by then to decrease any inhibitions on the mother's part towards revealing the family's life events.

One investigator conducted the interviews for both the samples. The bulk of family environment interviews with the 83

mothers occurred during February through May 1983 with a few remaining for the summer months. Three mothers of the 83 were monolingual Spanish speakers. Therefore an interpretor accompanied the investigator and conducted the interviews according to the investigator's instructions. The interviewer was blind to the history of all study children until the interview for each family was completed. If it were known which children had abberant growth periods prior to visiting the families then interviewing techniques may have shifted towards a more persistent style of searching for the stresses predicted by the hypothesis in the families of those specific children than in the families of children with fewer changes in growth rate. The 39 interviews for the standardized life event impact ratings were conducted in February 1984 after the data in the 84 life event surveys were reduced to an itemization of discrete types of events. This cummulative list was administered to the second set of mothers.

All the growth data for the 84 children and their mothers already were collected through the longitudinal study. The longitudinal population from which the 83 families were drawn also served as the reference population to compare with the growth of the subsample children. Anthropometric data gleaned for each six-month measurement of the children included weight, height and eight skinfolds (left and right sides of triceps, biceps, abdominal, and subscapular). The longitudinal study used several people to measure a single child over the three year period. Each

assistant was trained in standardized techniques and reached acceptable reliabilities and measurement agreement with all other personnel. Weight was measured at birth by the hospital nursery staff with a Detecto beam balance regularly checked with standard weights. Measurements of the children at older ages at home were made with a portable beam balance calibrated frequently. Length/height was measured supine for children under 18 months and standing at older ages. Lange ® calipers were used to measure skinfold thickness in duplicate to insure stable readings at each site. In addition to child growth measurements, mother's weight and height were obtained. All home visits from the longitudinal study were scheduled within plus or minus two weeks of each six-month interval since the child's birth.

## Data Reduction

### Growth

Before any calculations proceeded to reduce the growth data all weight, length and eight skinfold measures were adjusted to exact biannual intervals. The changes in growth between interviews scheduled over the two week variation in measurements dates were interpolated to fit an exact date of six-month measurements. This procedure then allowed comparison in growth changes between children.

Growth velocity was ascertained through twelve types of calculations in this study. These included both change in body mass via weight/length and change in fatness through skinfold thickness:

1. Weight/length change Z-score
2. Eight skinfolds sum change Z-score
3. Weight/length percent gain
4. Eight skinfolds sum percent gain
5. Weight gain percentile group
6. Length gain percentile group
7. Number of extreme growth periods in the 3 years
8. Number of aberrant growth periods in the 3 years
9. Ø-36 month length percent gain
10. Ø-36 month weight percent gain
11. Ø-36 month weight/length percent gain
12. Ø-36 month 8 skinfolds sum percent gain

Sex-specific weight/length change Z-scores and eight skinfolds sum change z-scores were calculated for each six-month interval by using the mean change and change standard deviation seen in the entire longitudinal study. The population's mean change seen in a specific six-month interval was subtracted from a child's absolute change for the period and this difference was divided by the population's standard deviation of its change measure. Therefore, a child's progress could be compared to the population as distance above or below the mean.

Calculations used to compare a child's progress in relation to himself/herself were the weight/length percent gain and the skinfolds sum percent gain for each of the six biannual intervals. Percent gain was calculated by subtracting a measure at Time 1 from Time 2, dividing by the Time 1 measure, and multiplying by 100. Thus, a child's growth in comparison to his or her attained level at the start of each measurement interval was possible and would correct for differences in birth size and family influences on (genetically programmed) size.

Incremental growth charts (Roche and Himes 1980) were used to classify each of the six-month interval's weight and length gains into one of eight percentile groups for each of the two parameters: $\leq$ 3%ile, 3-10%ile, 10-25%ile, 25-50%ile, 50-75%ile, 75-90%ile, 90-97%ile, $\geq$ 97%ile. Due to low cell sizes these groups were clumped before comparison with the family environment variables. Three overall groups resulted for both weight and length gain: $\leq$ 25%ile, 25-75%ile, and $\geq$75%ile. These categorical measurements were used to see if growth changes needed to be generally grouped to show any association with family variables if no associations were noted when using continuous measurement data.

The unclumped weight gain percentile groups were used to determine those children who exhibited extreme or aberrant weight gain growth periods during the three years. Only those children of the 84 who had complete three year data (51) were used in this segment. An extreme growth period was defined as $\leq$ 3%ile

or $\geq$ 97%ile in change. An aberrant period exhibited $\leq$ 10%ile or $\geq$ 90%ile in change. Children were classified as possessing 0, 1, 2 or 3 plus extreme periods and 0, 1, 2, 3 or 4 plus aberrant periods. Due to small numbers in "zero" extreme and aberrant groups, these numbers were combined with those children exhibiting one extreme and aberrant group, respectively. These reduced groups were used in calculations with family variables.

Three year velocity summaries were measured through child specific percent gain in length, weight, weight/length and skinfolds sum. It was possible that the measuring of family variables may have been too crude to show clear associations with six-month interval growth changes or that stressful environments did not show in growth changes over short time intervals but had a cumulative effect on longterm changes. Therefore, these intrachild summary changes were used to provide a comprehensive view of growth for these two purposes.

### Temperament

Responses to the 100 Behavioral Style Questionnaire items were compiled as instructed by the scale's authors into nine numerical subscales. Five of the nine subscales--rhythmicity, approachability, adaptability, intensity and mood--were used to calculate the five diagnostic clusters of recent temperament--difficult, easy, slow-to-warm-up, intermediate high and intermediate low--by classifying patterns in the high and low scores of

the five subscales. An overall numerical score of temperament was calculated for this study also by averaging the scores of the five selected subscales. A low score (minimum 1) indicated an easy child in behavior, while a high score (maximum 6) meant difficult behavior. Neutral ranged from 3 to 4 points.

Any changes in temperament since infancy were coded as presence or absence of change under each of the nine subscales calculated from the BSQ responses. An overall presence of significant behavioral change since infancy was scored as such if the child exhibited at least two subscale changes or just one change, that of mood. These criteria for significant temperament change were developed through a general examination of the mothers' presence or absence marks in the nine subscales. It appeared that a mother responded affirmatively to the question of her overall impression of behavior change having occurred in the child if she also evaluated the child as having changed specifically in at least two of the subscale areas or in mood alone.

**Social Support**

Various measures of social support were derived from the Norbeck Social Support Questionnaire and APGAR Satisfaction scales. The NSSQ provided three types of pure support scores--network size, degree of support (emotional and physical), and frequency of contact. These scores were calculated for each six-month period of the three years to account for only those

relationships whose duration existed during that particular time interval. All other relationships recalled by the mother as occurring in other periods were excluded from calculations for that specific interval. In addition to the pure scores combinations of these three factors were calculated to be used in comparison with the growth changes for possible synergistic effects in their strength of association with growth. A summary of the pure and combined factors as well as brief descriptions is shown in Table 1 on pages 57 and 58.

In addition to scores by six-month intervals, three year summaries were calculated on all the scales in Table 1. The responses to the six biannual intervals were averaged for each scale. Since very little change was seen in score values over the time periods, one time interval in comparison to any of the other six-month periods did not weight heavily in the summary scores.

Scoring of the APGAR Satisfaction scales was followed according to the measure's authors for each of the relationship categories. Responses to the statements were assigned values of zero for "never" up to four points for "always" and averaged over the five items per relationship. An overall family satisfaction score averaged the husband/partner and child(ren) scales. Total satisfaction averaged the mean responses of husband/partner, child(ren), average relatives, and friends scores. None of the individual scales were weighted more heavily than the others in computing the family and total scores. A score of "Ø.ØØ" meant no

Table 1.

NSSQ Support Scales, Factor Combinations, and Descriptions

| Scale | Factor Combination | Description |
|---|---|---|
| Network size | Size | Total number of relationships per 6-month interval |
| Average emotional support | Quality | Mean response of the 2 affirmation questions averaged over all relationships per interval |
| Average physical support | Quality | Response of physical aid question averaged over all relationships per interval |
| Average NSSQ rating | Quality | Mean of affirmation and aid questions averaged over all relationships per interval |
| Average contact days | Frequency | Response of frequency question* averaged over all relationships per interval |
| Total emotional support | Quality, size | Mean response of affirmation questions totaled over all relationships per interval |
| Total physical support | Quality, size | Response of aid question totaled over all relationships per interval |
| Total NSSQ rating | Quality, size | Mean response of affirmation and aid questions totaled over all relationships per interval |
| Total contact days | Frequency, size | Response of frequency questions totaled over all relationships per interval |

*All responses to frequency (1.0-5.0) given by mothers were converted to days of contact per six months (ratio data) to more accurately reflect contact differences between the original response choices (ordinal data).

**Table 1**--Continued

| Scale | Factor Combination | Description |
|---|---|---|
| Weighted average emotional support | Quality, frequency | Mean response of affirmation questions multiplied by frequency per relationship before averaging over all relationships per interval |
| Weighted average physical support | Quality, frequency | Response of aid question multiplied by frequency per relationship before averaging over all relationships per interval |
| Weighted average NSSQ rating | Quality, frequency | Mean response of affirmation and aid questions multiplied by frequency per relationship before averaging over all relationships per interval |
| Weighted total emotional support | Quality, size, | Mean response to affirmation questions multiplied by frequency per relationship and totaled over all relationships per interval |
| Weighted total physical support | Quality, size frequency | Response to aid question multiplied by frequency per relationship and totaled over all relationships per interval |
| Weighted total NSSQ rating | Quality, size frequency | Mean response to affirmation and aid questions multiplied by frequency per relationship and totaled over all relationships per interval |

satisfaction and "4.00" held utmost satisfaction. Neutral scores ranged from two to three.

**Life Events**

Life events were coded by specific event type (see Appendix C for listing), six-month period of incidence as well as period(s) of duration, and positive, neutral or negative impact on child, mother and family. For each six-month period, as well as a three year tally, the following values were calculated with the help of the impact ratings from the standardizing interviews:

Total number of life events by incidence and prevalence,

Number of negative life events by incidence and prevalence,

Number of large life events by incidence and prevalence,

Number of large negative life events by incidence and prevalence,

Percent negative life events by incidence and prevalence,

Percent large life events by incidence and prevalence, and

Percent large negative events by incidence and prevalence.

An event was classified as negative if the mother or child reacted so. Generally, if another family member reacted negatively to an event either the infant or mother also did. Therefore reactions only in the feeding dyad were considered to simplify calculations.

An event which took place over more than one six-month interval was tallied in all of the six-month periods of occurrence when values were calculated by prevalence. This method was used

to account for both the number and chronicity of events. Values summed by incidence only counted those events which began in a specific six-month interval for that period's event score. Both absolute numbers of events and percent of events occurring with specific impact or desirability were recorded to coincide with results of studies mentioned in the literature review which showed that different methods of tabulation could give varying results in correlations with health, although small. Therefore, using the two variations, in both the methods of classifying events by incidence or prevalence and counting events by absolute number or percent of total events, allowed for comparison of each method's strength of association with growth changes. Another reason for using percent type of life events was to correct for any ethnic differences in overall impact or desirability ratings of events and for the amount of "uneventfulness" occurring in some families (low total number of events). The percent distribution of the impact or desirability of those events which did occur in these "uneventful" families could have remained similar or changed in comparison to the distributions seen in other more "eventful" families.

The responses to individual events in the standardizing impact interviews were compiled from the 39 interviews to classify each event type as large, ambiguous, or small impact. If greater than two-thirds of all mothers reported an event as large or small it was classified as such. All those events were considered

ambiguous in effect in which not as great a consensus was reached on their impacts (50-65% large or small). Before this compilation was done all events were analyzed separately for ethnic and education differences in ratings by Chi-square analysis. If relatively few events showed significant differences then all mothers' responses were tallied together. Otherwise, separate rating systems according to either ethnicity or education would be made to rate the event impacts of the 83 original mothers.

### Demographic Data

Demographic data were categorized into broader groups of information than actually obtained in the interviews in order to attain reasonable analytical groups. For example, mother's education levels were divided into high school graduate or less, some college, and college degree or more. Child ethnicities were grouped into the mother-father combinations of both Mexican American, both Anglo, Mexican American and Anglo, and others. Classifying parental ethnicities into matched and unmatched groups was done to reflect the cultural environment(s) influencing the child's development. The last demographic item grouped was mother's working. Determined from the life events survey, three categories were formed: mothers who did not work (30), those who worked under one and a half years (26), and who worked more than one a half years (28).

## Data Analysis

### Descriptive Statistics

Before testing the strength of relationships between child growth and family variables, frequency distributions and descriptive statistics were constructed on all adjusted raw and reduced growth data, temperament scores, maternal support and satisfaction factors, life event calculations and demographic markers. An examination of their frequencies classified the data into continuous or grouped species by their distributions. It should be noted that the frequency distributions of Z-scores on the adjusted attained growth (weight, length, and weight/length) did not use Z-scores calculated from the NCHS standards. Only the longitudinal population's means and standard deviations were used. The computer program which calculated NCHS Z-scores truncated all Z-scores beyond $\pm 2$ standard deviations and tagged them as unable to determine.

Other statistics besides basic frequencies were used to preliminarily define the temperament, support, life events and growth factors. For each mean of the nine subscales produced from the Behavioral Style Questionnaire a 95% confidence interval was calculated and compared to that subscale's mean reported by the questionnaire's developers. If all the standard reported means were included in this population's confidence intervals then the children would be considered to possess a similar distribution of

temperaments as detected in the standardizing population, and the procedures suggested for classifying behavioral styles would be appropriate for describing these children. In addition, ethnicity differences if any on BSQ averages and styles were checked by ANOVA and Chi-square analysis, respectively.

Stability in the maternal support systems was checked by calculating the differences in the NSSQ factors from one six-month period to the next and determining the percentage of families with changes in each of the pure scores. Also, effects of parents' ethnicity, mother's education level and her length of working out of the home on reported support ratings were checked by analysis of variance. Bivariate regression determined the relationship between degree of social support and mother's age.

A possiblity was present for the mother's ability to recall life events to be directly influenced by the length of time mothers had to remember. Therefore, a Pearson correlation coefficient was calculated between the three year total number of life events by incidence per family and the age of its child at the time of interview. In addition to a bias of time existing, ethnic differences in the total number, desirability, and impact scores of the 84 families were checked using ANOVA procedures. As mentioned earlier, mother's ethnic and education groups were checked against event impact ratings in the 39 standardizing interviews by Chi-square analysis.

Ethnic differences in growth parameters were determined by analysis of variance. Particular interest was devoted to the six children with mother-father ethnicities that were not Mexican American and/or Anglo combinations. The weight/length and skinfolds sum change z-scores for each of the six growth periods were compared to the frequency distributions of those parameters for all the subjects to see if these six children were vastly divergent from the 78 other children.

**Hypothesis Testing Statistics**

In the following tests all relationships were analyzed with one of three basic methods: regression, analysis of variance (ANOVA) or Chi-square analysis. If the distributions in two sets of data to be tested appeared continuous then regression analysis ensued. If one set showed a continuous distribution and another set exhibited grouped characteristics ANOVA was used. If both variables were grouped then Chi-square analysis was appropriate. All statistics were employed in compliance with the basic assumptions of each model.

The purpose of all hypothesis testing statistics was primarily to reveal any associations between the family variables and the child's growth changes. Some factors possibly influencing the mother's change in weight/height were tested also. Associations were checked in both the six-month intervals and three year overall summaries.

Each six-month change in growth was tested against the family, child and mother variables for that interval. All of the selected growth change parameters individually were compared to each of the reduced scores in temperament, social support, satisfaction, life events, mother's body mass changes, and household size. When the child's growth was compared to mother's change in weight/height, intervals were eliminated for each child in which his/her mother was pregnant. Eliminating pregnancy intervals therefore did not allow any relationship between child's and mother's growth changes to be confounded by the normal weight gain during pregnancy. When comparing growth to support and life events three separate selections of families were chosen for the tests. First, all families were lumped together in the analysis. Then all those children with new siblings in the 6-12, 12-18, 18-24 or 24-30 month intervals were grouped from those who did not have new siblings. Perhaps a support-growth or event-growth association could be present in those children undergoing a tremendous life change for themselves while those youngsters not changing status within the family would be less sensitive to support and stress measures. To provide a lag time in effect of sibling birth on growth changes, growth and support up till 36 months was compared between the two sets of children. Lastly, number of total household members and adults were compared to child growth changes to see if the number of persons available effected the child's growth rates perhaps through changes in food consumption.

Three year growth summaries were compared separately to the three year averaged responses to temperament, support, satisfaction, life events, and number of household members. A particular examination of growth was that of family variables compared to total numbers of extreme and/or aberrant growth periods experienced in the three years. If children normally compensate in equal but opposite physical impacts towards large or small growth changes at one time period then perhaps the initial growth aberrancy could occur from environmental influences while the following change be only a physical compensation. Therefore, children with higher family stress variables may have greater numbers of outlying growth periods than children with less extremes in family variables.

Particular interest was focused on the growth velocities in the first six months compared to the rates seen in the remaining two and one-half years. Since catch-up and fall back in growth may occur regardless of environmental influence during the first few months (Falkner 1973), perhaps the growth changes in those months would not run at a similar pace to those seen later. Therefore, correlation coefficients were computed for percent gain in length, weight, skinfolds sum and weight/length in Ø-6 months compared to 6-36 months. If these correlations were not of sufficient magnitude then two and one-half year percent gains in growth parameters were compared to the family variables.

The strengths were tested of attained growth versus growth velocity on their associations with family environment. All of the three year summaries of family variables were related to each child's age three adjusted raw growth parameters (length, weight, weight/length, skinfolds sum) and compared to those relationships using the same growth parameters expressed as change over the three years.

To control for partial correlations between family variables a series of multiple regressions of family factors on different growth parameters per six-month interval as well as three year summary were calculated and their significance checked by F statistics. Multiple regression was completed on average BSQ, average size of support network, average frequency of contact with support network, average support rating, total satisfaction, percent negative life events, and percent large life events. These variables were selected out of the entire array of family factors to provide a comprehensive description of the family environment with as few variables as possible.

Finally the mother's weight/height change was tested with her support system variables and life experiences per six-month interval.

## Limitations

Various limitations of this study population surfaced during the course of research.

The population used was not randomly selected. Only those families from the longitudinal growth study which persisted faithfully through the three years were reinterviewed. Perhaps relationship dynamics differed within these families compared to those families which either refused to be interviewed, were not located or did not have four consecutive longitudinal interviews recorded. The results of this study therefore may not be fully generalizable to a broader population.

With any interview the prospect exists for informants to withhold or distort sensitive material (Cobb 1974, Litman and Venters 1979). Even less sensitive areas are recalled improperly. A case in point was a study by Robbins (1963) on middle class parents in their recall of child-rearing practices and the child's developmental changes. Throughout the three year longitudinal study these parameters were assessed periodically. At the study's conclusion each parent was asked for a three year synopsis of the practices and developments that occurred. Both the mothers and fathers had a significant lack of accuracy in their recalls. Mothers also were influenced by "experts" opinions and tended to report inaccuracies towards a desired answer.

For this study each mother's recall of her social support network and child's temperament may have been distorted to what truly constituted those factors during those three years. Perhaps the present situation she and the family were living in at the point of these interviews influenced her descriptions. For

example, a mother divorced after the child turned three might have had different feelings regarding her former husband recently than over past years' experiences, and her current emotions would color her impression of him in the past. If the child's behavior were, for example, distressing to the mother currently she might recall past behaviors in a different light than they actually occurred. Therefore, during the interviews mothers were asked repeatedly to rate their support networks as they had felt back at the previous time in order to reduce this bias.

Another influence on the accuracy of recall was the use of a single informant for all of a family's characteristics. Gersten and associates (1974) discuss the limitations of using a single evaluator for both life events and child behavior. The reporting of either parameter may be influenced by the content of the other factor. In Gersten and co-workers' research and in this present study mothers reported on all aspects of family life and child personality. Possibly some mothers shaped the accounts of family life events to fit the child's behavioral development. As a whole, the mother's view of family life and her opinions alone were gathered.

A major concern in the course of interviewing was the variability present in the mothers simply recalling life events. At times some mothers expressed how difficult it was to remember events and to accurately place them in a time sequence. A substantial portion of life events literature has has studied

recall reliabilities (Jenkins, Hurst and Rose 1979, Rahe 1973; Uhlenhuth et al 1977). One study (Uhlenhuth et al 1977) looked at an 18 month retrospective period of recall. An average decrease of five percent occurred in the number of events per month previously recalled. Doubts have risen about the validity of results from longterm life stress surveys and researchers exercise caution in trusting the recall reliabilities of these studies. Events recalled years later must be very important to the person and possess certain characteristics, particularly those serious in nature (Jenkins, Hurst and Rose 1979). Therefore, in the present study the most reliable life events recalled and accurately placed in time sequence were probably those designated as having large impacts or negative desirability. Of those families in this study with low total life events reported, the resulting low counts could have been due to a number of reasons: actual uneventfulness for the family, mother's inability to recall or a restrictive bias on her part.

## RESULTS

The interviews spanned an average of two and one-half hours and ranged from one to five hours. All mothers were receptive to the procedures and appeared to answer questions without reservation. Only one mother announced that she was withholding information from the life events survey while all other mothers either replied honestly or refrained without notification. Generally, the mothers were sufficiently capable of answering all questions on their children's temperament, social support system and satisfaction. Wide variations occurred in the mothers' recall of life events ranging from exact monthly placement to the need for assistance through questioning to place an uncertain event before or after an event of known occurrence.

Ease of rating events and support members varied. Rating of life events by desirability was easily done by all mothers. The rating of social support members and the mothers' satisfaction was more difficult using the semi-quantitative responses as seen in the interview form, Appendix A. Each mother defined the responses uniquely. For example, a response of "a great deal" for the NSSQ questions may not have been valued as highly by some mothers as others. Therefore, some of the mothers may have used this rating more frequently on acquaintances, as opposed to close supporters, than by other women. In addition, with time the mothers' feelings towards members of their family and friends

and friends changed and clouded their recall of past opinions. As one mother voiced, it was hard to separate her negative feelings towards her ex-husband now from how she felt three years ago. Another mother commented that the criteria she used to rate husband, child, relatives and friends in the satisfaction scale were different between each type of support. Since there was no assessment of how the criteria were different within and between all 83 mothers, scoring of each degree of satisfaction was equally distanced from each other (Ø,1,2,3,4), "Ø" being "not at all" to "4" representing "a great deal".

Thirteen interviews (15%) were conducted with a mother in the presence of her husband or adult relative(s). Qualitatively they appeared to run similar in content with the private interviews. Generally, those husbands who did attend were congenial and either actively participated or quietly occupied themselves in another part of the house.

In only two cases did the child's frequency or style of interruption prolong the interview. One child was sensitive to hearing comments about himself in the questionnaire and physically became disturbed (temper tantrum). This behavior on his part was reflected in his temperament score. The other case was only a situational disturbance in that the child was initially being weaned from the bottle that morning and stopped the interview several times by his protests. Less than five percent of all mothers commented that their children's interruptions disturbed

their ability to concentrate on the interview in which case the interviewer attempted to relax the situation through soothing comments. All interviews concluded on a positive note despite any interruptions during the visit.

## Family and Growth Data: Description and Frequencies

### Demographic Data

Equal portions of each sex (42) were studied, and almost half (46%) were firstborn. Classified by parent ethnicities about 27% (23) of children were from dual Mexican American families, 55% (46) from dual Anglo parents, 10% (8) from Mexican American/Anglo parents and 7% (6) from other ethnicities. The children's ages at time of the current interviews ranged from a little over three to just past six years old. The amount of time a mother had to recall back depended upon the child's current age: 29% (24) of children had graduated from the longitudinal growth study less than one year previous, 58% (49) were between one and two years beyond graduation (4 to 5 years old), and 13% (11) were two to three years older than the three-year-old graduation age.

Maternal status characteristics varied widely. Educationally they ranged from junior high school to graduate degrees. Half of all mothers had attained a high school degree, GED, or less while an equal proportion had some college experience or

beyond. At the time of the interview almost 80% (66) of mothers were still married to the child's father and the remaining number, 12 and 6 respectively were divorced at some point since the child's birth or never married. At no six-month period during the three years of interest were more than 18% (15) of mothers pregnant at one time, beginning at six months and peaking at 18 months of the study children's ages. At the child's birth mothers' ages ranged from 17 to 41 years with a mean of 24.5 years.

The number of adults and children in the household were assessed each six months. The grand mean of adults and children, respectively, over all six biannual periods was 2.4 and 2.2. Number of adults ranged from 1-8 with 95% of all families possessing up to only four adults. One to five children occupied 95% of the families with the remaining percent expanding up to eight children under 18 years of age. Combining these two factors resulted in an overall household size ranging from 2 to 13 and averaging 4 to 5 members.

A characteristic marker in families with young children is the childcare arrangements and frequency of use. Forty-four children (52%) received some type of childcare throughout the three year span of the longitudinal study. Individual sitters were used for 39 children while 16 children attended daycare centers. Eleven children were cared for by both a sitter and daycare center at some time. Twenty-one children or 48% of those under childcare

experience at least one change in sitters or daycare centers. It was more common for a Mexican American mother to report her child being cared for by relatives than for an Anglo mother to state it. Lastly, sitting hours ranged from a couple hours for a few times a week to 8 to 10 hours each day for the entire work week.

Temperament

Means, standard deviations, ranges and medians of all nine scales are displayed in Table 2 on page 76 . Inspection of frequency counts reveal a normal distribution of continuous values. The last item, average of five scales, was used as the continuous measurement value for overall temperament. As mentioned in Methods this value represents the compilation of those five scales used to categorize subjects into discrete behavioral styles. The greater the number the more difficult is the temperament. Comparison of medians and means shows essentially no skewing. For each scale a 95% confidence interval around its mean was calculated and compared to the standard mean reported by the scale's developers. All nine standard means were included in the confidence intervals confirming that the 84 children assessed were similar to the instrument's standard population and therefore appropriately measured by the questionnaire.

Table 3, page 77, portrays the five behavioral styles possible and their frequency counts and percent distributions. In comparison to the distribution reported by McDevitt and Carey the

Table 2.

Mean, Standard Deviation, Range, and Median of Temperament Scales*
N=84

| Scale | Mean ± SD (Range) | Standard Mean** | Median |
|---|---|---|---|
| Activity | 4.0 ± .1 (2.5-5.5) | 3.6 | 4.0 |
| Rhythmicity | 3.0 ± .1 (1.5-5.0) | 2.8 | 3.0 |
| Approachability | 2.9 ± .1 (1.0-5.0) | 3.0 | 2.9 |
| Adaptability | 2.9 ± .1 (1.5-4.5) | 2.6 | 2.8 |
| Intensity | 4.6 ± .1 (3.0-6.0) | 4.5 | 4.6 |
| Mood | 3.5 ± .1 (2.0-5.0) | 3.3 | 3.4 |
| Persistence | 3.1 ± .1 (1.5-5.5) | 2.9 | 3.0 |
| Distractability | 4.0 ± .1 (2.0-5.0) | 3.9 | 4.1 |
| Threshold of Attention | 3.8 ± .1 (2.5-5.0) | 4.0 | 3.7 |
| Average of Five Scales | 3.4 ± .1 (2.5-4.5) | 3.2 | 3.3 |

*For ease of reading all values were rounded to one decimal place. When followed by a five even numbers remained the same while odd numbers were rounded up. Range variables were rounded to the nearest half.

**From McDevitt and Carey scaling instructions.

Table 3.

Frequencies of Behavioral Styles in
Study Population and Standard Population

| Style | Study Population Frequency Count | Study Population Percent Distribution | Reported Percent Distribution in Standard Population* |
|---|---|---|---|
| Easy | 22 | 26.2 | 33.1 |
| Difficult | 21 | 25.Ø | 18.6 |
| Intermediate | 41** | 48.8 | 32.3 |
| Slow-to-warm-up | Ø | Ø.Ø | 16.Ø |

*From McDevitt and Carey, 1978

**Tabulated from both intermediate high and intermediate low categories, 1Ø and 31 respectively.

current population was heavily weighted with intermediate temperaments, and equally proportioned in easy and difficult styles. Although there were no slow-to-warm-up children, this category is smallest in the McDevitt and Carey distributions and a number of the intermediate low children were closely patterned to the slow-to-warm-up temperament but did not perfectly fit the exacting pattern called for in the scaling instructions.

A final behavioral assessment was the determination of any significant change in temperament of the present style from those behaviors displayed previously. Approximately 38% (32) of the children significantly changed in at least two of the nine scales or in mood alone.

**Norbeck Social Support Questionnaire**

Eighteen types of relationships were recalled in the mothers' networks (listed by three year totals of six-month periods listing each category): friend (74Ø), sibling (377), mother (372), husband-partner (355), other relative (246), father (2Ø9), mother-in-law (145), child (134), neighbor (78), father-in-law (66), grandparent (54), work associate (44), counselor (23), minister (18), other (18), health care provider (1Ø), God (6), self (6). Categorized frequency of contact over all relationships spanned: 1% of all relationships had contacts of less than or equal to once per year, 7% a few times year yearly, 12% monthly, 34% weekly, and 46% daily contacts. Overall NSSQ support ratings

varied between the relationships. For relatives, friends and neighbors the following list gives the percent of each relationship which possessed the top 25% of the NSSQ support rating (emotional and physical support combined) for that particular relationship: 77% husband-partners, 73% of mothers, 52% of fathers, 45% of siblings, 44% of grandparents, 43% of friends, 42% of mothers-in-law, 37% of other relatives, 36% of fathers-in-law, 25% of children, and 16% of neighbors.

Table 4, page 80, lists the basic descriptive data of the support variables calculated from the questionnaire. Frequency distributions show all factors to be continuously and normally displayed with a slight skewness to the left in the combined factors, network size and average contact days but not in average emotional, physical or NSSQ ratings. Very little change occurred in the support ratings from one six-month interval to the next as shown in Table 5 on page 81. A maximum of 15% of mothers changed a support rating from one period to the next. Examination of the network size, average frequency of contract and average NSSQ rating which the 36 mothers reported a change or changes in revealed no overriding pattern of increase or decrease in the three pure factors of size, frequency or quality of support in networks.

Three characteristics, mothers' age, education and working history were checked for their influence on the support variables. Correlation coefficients of mother's age at child's birth with

Table 4.

Mean, Standard Deviation, Range, and Median of Three Year Summaries of Social Support Factors From the NSSQ*, N=84

| Factor | Mean ± SD (Range) | Median |
|---|---|---|
| Network Size | 5.8 ± .3 (1-17) | 5.0 |
| Average Contact Days | 105.9 ± 5.0 (5-182) | 101.8 |
| Total Contact Days | 588.1 ± 40.0 (19-1852) | 467.8 |
| Average Emotional Support | 2.9 ± .1 (1-4) | 2.8 |
| Weighted Average Emotional Support | 316.6 ± 17.1 (13-728) | 278.9 |
| Average Physical Support | 2.7 ± .1 (0-4) | 2.7 |
| Weight Average Physical Support | 316.1 ± 17.9 (0-728) | 305.9 |
| Average NSSQ Rating | 2.8 ± .1 (1-4) | 2.8 |
| Weight Average NSSQ Rating | 316.4 ± 16.8 (8-728) | 283.2 |

*For ease of reading values were rounded to one decimal place. When followed by a five, even numbers remained the same while odd numbers were rounded up. Range variables were rounded to the nearest whole number.

Table 5.

Percent of Mothers Which Changed Support Ratings From One Six-Month Period to the Next, N = 84

| Rating | Period 1-2 | Period 2-3 | Period 3-4 | Period 4-5 | Period 5-6 |
|---|---|---|---|---|---|
| Network Size | 10% | 10% | 10% | 13% | 10% |
| Average Contact Days | 12 | 8 | 14 | 15 | 13 |
| Average Emotional Support | 10 | 8 | 12 | 13 | 10 |
| Average Physical Support | 9 | 6 | 11 | 13 | 11 |
| Average NSSQ Rating | 8 | 8 | 12 | 14 | 11 |

support revealed a small but significant negative association with physical support (-.24, $p \leq .05$). Analysis of variance showed that mother's with a high school degree or less received significantly more support member contact and weighted emotional support than their more highly educated counterparts. Mothers who worked less than one and a half years had less contact with support members ($p \leq .05$) than mother's who never worked or worked greater than one and a half years. All other support variables showed no associations with mother's age, education or work history.

All combined support factors were highly correlated with the pure scores ($p \leq .001$) since the pure variables, network size, frequency and quality, were used to create the combined scores. Interestingly, some of the pure support factors were related to each other. Table 6 on page 83 shows that as network size increases the average emotional support and NSSQ ratings decrease. Since the average emotional support is used to help produce the NSSQ rating they show a high correlation of 0.85. Both average contact and emotional support are positively related to physical support which makes intuitive sense.

**Satisfaction**

Table 7, page 84, summarizes the results of the APGAR satisfaction questionnaire. The six individual scales listed first in the table are fairly similar in mean responses except for mother-in-law which have a lower range of scores. All medians

Table 6.

Correlation Coefficients of Three Year Summaries of Pure Support Factors Among Themselves, N = 84

| | Network Size | Average Contact | Average Emotional | Average Physical |
|---|---|---|---|---|
| Average Contact | (-.16) | | | |
| Average Emotional | -.28* | (.06) | | |
| Average Physical | (-.13) | .28** | .32** | |
| Average NSSQ | -.26* | (.20) | .85*** | .77*** |

*P $\leq$ .05
**P $\leq$ .01
***P $\leq$ .001

**Table 7.**

Mean, Standard Deviation,
Range and Median of Satisfactions*
N = 84

| Member | Mean ± SD | (Range) | Median |
|---|---|---|---|
| Husband-Partner | 2.4 ± .1 | (Ø.Ø-4.Ø) | 2.4 |
| Child(ren) | 2.6 ± .1 | (1.Ø-4.Ø) | 2.8 |
| Mother's Relatives | 2.8 ± .1 | (Ø.5-4.Ø) | 3.Ø |
| Mother's In-Laws | 1.8 ± .1 | (Ø.Ø-3.Ø) | 2.Ø |
| Combined Relatives | 2.5 ± .1 | (Ø.Ø-4.Ø) | 2.6 |
| Mother's Friends | 2.7 ± .1 | (Ø.Ø-4.Ø) | 2.8 |
| Total Satisfaction | 2.6 ± .1 | (1.5-4.Ø) | 2.6 |
| Family Satisfaction | 2.5 ± .1 | (Ø.5-4.Ø) | 2.6 |

*For ease of reading values were rounded to one decimal place. When followed by a five even numbers remained the same while odd numbers were rounded up. Range variables were rounded to the nearest half.

are slightly skewed to the right of the means in the continuous distribution of values. Total satisfaction is a combination of all six variables and its mean is near the middle of all possible responses available to the mothers (Ø,1,2,3,4). Family satisfaction is computed by only using the husband-partner and child(ren) scales resulting in a similar mean to that seen in total satisfaction. The husband-partner, combined relatives and mother's friends scales span the entire range of responses (Ø to 4) while all other scales have slightly truncated ranges.

**Life Events**

A total of 1607 life events were reported for the 84 cases, averaging 19 events per family as shown in Table 8 on page 86. Both absolute counts and percents of negative, large and large negative events are all subsets of the total events count. Only event variables by incidence and not prevalence are shown since incidence variables count each event only once at the time of initial occurrence rather than repeatedly over all periods of duration. Therefore incidence scores more clearly show for descriptive purposes the type of events recalled. Ranges for each variable are wide especially for the percent methods. Most of the medians are slightly skewed to the left of the means in the continuous and normal frequency distributions of each variable.

All nine event groups received a large number of entries. Listed in priority of incidence they include: family (322),

Table 8.

Mean, Standard Deviation, Range and Median of Three Year Summaries of Life Events by Incidence*
N = 84

| Event Category | Mean ± SD | (Range) | Median |
|---|---|---|---|
| Total Life Events | 19.1 ± .9 | (3-46) | 18.Ø |
| Negative Life Events | 7.8 ± .5 | (1-29) | 7.Ø |
| Large Life Events | 11.4 ± .6 | (Ø-31) | 11.Ø |
| Large Negative Life Events | 6.2 ± .4 | (Ø-2Ø) | 6.Ø |
| Percent Negative Life Events | 39.9 ± 1.7 | (12-89) | 4Ø.Ø |
| Percent Large Life Events | 58.3 ± 1.8 | (Ø-1ØØ) | 58.5 |
| Percent Large Negative Life Events | 31.2 ± 1.6 | (Ø-64) | 29.2 |

*For ease of reading values were rounded to one decimal place. When followed by a five even numbers remained the same while odd numbers were rounded up. Range variables were rounded to the nearest whole number.

health (284), work (262), legal matters and finances (206), social activities (138), childcare (135), residence (103), school (90) and marriage (67). A listing of all 171 specific types of events included in these nine categories is available in Appendix C.

Desirability ratings for events on the children and mothers were distributed for children as 41% (657) positive or neutral, 16% (260) negative, and 43% (690) not rated, and for mothers as 34% (547) positive or neutral, 32% (524) negative and 33% (536) not rated. The pace of the life events survey was rapid since it was conducted as a discussion. Therefore, it became difficult to elicit desirability responses for both mother and child in all events. However, when negative desirability per event was coded as negative for either mother or child, events were redistributed to 59% (950) positive, neutral or unknown and 41% (657) negative.

Intercorrelations between the different types of event scales were examined. On a per six-month basis up to only 15 (16%) of the 91 correlations of prevalence and incidence factors among themselves were not correlated at the .05 level. All negative and large event measures were functions of the total events score. Table 9 on page 88 demonstrates how highly correlated the prevalence and incidence scales were. At 0 to 6 months prevalence and incidence were identical. Any clumping of results seen in the hypothesis testing correlations may be explained by the high correlation coefficients discussed here.

Table 9.

Correlation Coefficients of Prevalence and Incidence Pairs of Life Event Variables Among Themselves per Six Months ($p \leq .001$) N = 84

| Prevalence vs. Incidence | 0-6 Mos | 6-12 Mos | 12-18 Mos | 18-23 Mos | 24-30 Mos | 30-36 Mos |
|---|---|---|---|---|---|---|
| Total Life Events | 1.0 | .86 | .77 | .82 | .76 | .80 |
| Negative Events | 1.0 | .79 | .74 | .64 | .84 | .78 |
| Large Events | 1.0 | .82 | .74 | .81 | .81 | .74 |
| Large Negative Events | 1.0 | .77 | .69 | .66 | .81 | .78 |
| % Negative Events | 1.0 | .62 | .57 | .61 | .68 | .47 |
| % Large Events | 1.0 | .51 | .62 | .60 | .52 | .73 |
| % Large Negative Events | 1.0 | .55 | .63 | .61 | .58 | .69 |

Appendix D lists all the events standardized by large, ambiguous or small impacts. Table 10, page 90, shows the results of Chi-square analysis of the large and small impact ratings assigned by mothers according to their education, (1) less than or equal to high school or (2) some college or beyond, and ethnicity, (1) Mexican American or (2) Anglo. In most of the 12 event types more Anglos rated the items as possessing large impacts than the Mexican American mothers rated. Although these differences were significant at the .05 level all ethnic and education groups were lumped together since only 2% (29) out of all reported survey events from the 83 families were from the biased items and contributed little to an overall effect. When the standardized impacts were used on the 1607 events reported 60% (959) of the items were coded as large, 24% (390) as ambiguous, and 16% (258) as small impacts.

To test for overall recall ability on the mother's part a Pearson correlation was run on the three year total number of events by incidence against the child's age at the interview. No statistically significant association was revealed showing that those mothers with older children recalled just as many events on the average as mothers did with younger children. This non-significant correlation does not comment on the issue that perhaps all the mothers were hampered in their recall by just the minimum time span available of three years and any additional time of recall did not change their already limited capabilities.

Table 10.

Standardized Life Events Ratings
Different by Mother's Ethnicity and Education*
-- Frequency of Occurrence in Family Environment Interviews

| Event # | Difference | Description | Frequency |
|---|---|---|---|
| 220 | Ethnicity | Child layed off from work | 1 |
| 408 | Ethnicity | Boyfriend moves out | 1 |
| 422 | Ethnicity | Relative divorced or separated | 7 |
| 444 | Ethnicity | Child moves back into home | 2 |
| 445 | Ethnicity | Relative moves closer | 1 |
| 512 | Ethnicity | Relative in jail | 1 |
| 518 | Ethnicity | Hired lawyer and fees high | 1 |
| 818 | Ethnicity | Change in family doctors | 1 |
| 101 | Education | Licensing exam taken by mom | 1 |
| 303 | Education | Divorce final | 4 |
| 602 | Education | Increase in social activities for mother | 8 |
| 618 | Education | Mother takes vacation from work and stays at home | 1 |

*Differences were significant at .05 level.

Analysis of variance of the effects by parents ethnicity pairs on life events variables as well as temperament, support and satisfaction scales revealed no influence on temperament or satisfaction. Figure 1 on pages 92 and 93 shows the selected items of all support and life event variables by three year summations which did exhibit ethnic differences. Only those support factors which incorporated frequency of contact showed significant ethnic differences as seen in graphs (a) through (d). Mothers in dual Mexican American families had greater contact and weighted emotional, physical and overall support than mothers of dual Anglo households. Network size was immune to any ethnic influence. Absolute numbers of total and large life events were reported to a greater extent by dual Anglo families than dual Mexican American or mixed families. Percent negative, large and large negative life events were free of ethnic biases and more clearly represented all families in hypothesis testing calculations.

Anthropometric Data

Birth and three year adjusted raw anthropometric data are displayed for each sex in Table 11, page 94, to show that these children were not excessively under or over the United States (NCHS) population standards. Frequency distributions of these parameters were all normal and not skewed in any consistent direction.

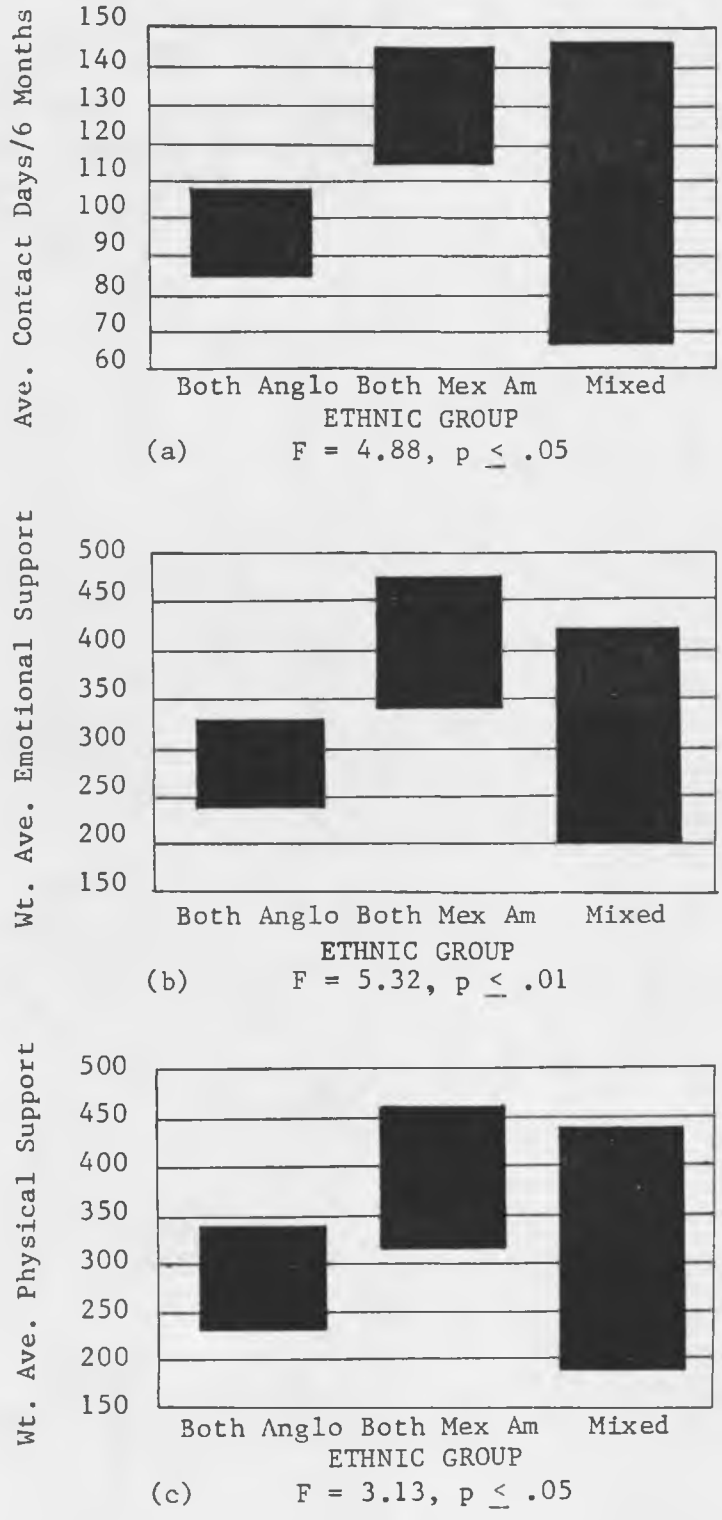
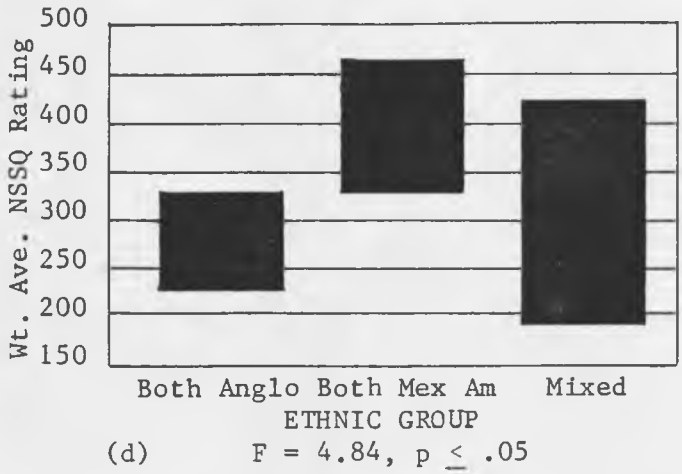
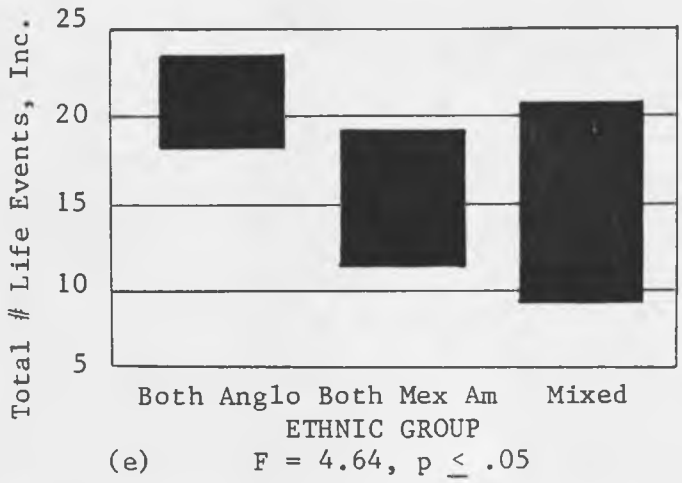


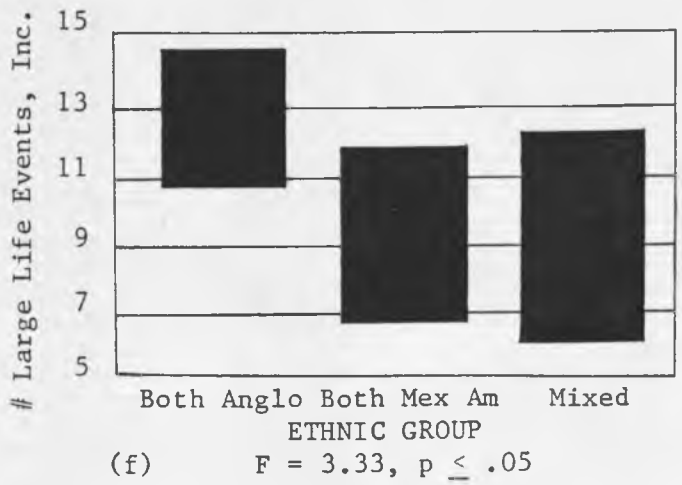

Figure 1. Confidence Intervals of Support and Life Event Variables by Parents' Ethnic Group (Both Anglo = 46, Both Mexican American = 23, Mixed = 8)




(d) $F = 4.84$, $p \leq .05$




(e) $F = 4.64$, $p \leq .05$




(f) $F = 3.33$, $p \leq .05$

Figure 1 --Continued

## Table 11.

Adjusted Raw Anthropometric Data: 0 and 36 Months*

| Sex | Age (Mos) | Measurement | Mean ± SD (Range) | Median | NCHS Z | NCHS %ile | N |
|---|---|---|---|---|---|---|---|
| Female | Ø | Weight (kg) | 3.37 ± .Ø6 (2.5-4.Ø) | 3.48 | .39 | 64.1 | 42 |
| Female | Ø | Length (cm) | 5Ø.1 ± .3 (45.Ø-54.Ø) | 5Ø.4 | .12 | 54.7 | 42 |
| Female | Ø | Weight/Length (gm/cm) | 67.1 ± 1.1 (51.5-82.5) | 68.7 | -.14 | 44.3 | 42 |
| Female | Ø | Skinfolds sum (mm) | 13.4 ± .5 (9.Ø-24.8) | 13.3 | -- | -- | 38 |
| Female | 36 | Weight (kg) | 14.21 ± .24 (11.Ø-18.5) | 13.9Ø | .Ø6 | 52.2 | 39 |
| Female | 36 | Length (cm) | 94.4 ± .5 (85.Ø-1ØØ.Ø) | 94.Ø | .12 | 54.9 | 38 |
| Female | 36 | Weight/length (gm/cm) | 151.7 ± 2.Ø (126.5-184.Ø) | 15Ø.9 | .17 | 56.8 | 37 |
| Female | 36 | Skinfolds sum (mm) | 28.Ø ± 1.1 (15.Ø-55.5) | 26.3 | -- | -- | 38 |
| Male | Ø | Weight (kg) | 3.37 ± .Ø7 (2.5-4.Ø) | 3.35 | .2Ø | 58.Ø | 42 |
| Male | Ø | Length (cm) | 5Ø.9 ± .3 (48.Ø-56.Ø) | 51.Ø | .19 | 57.6 | 42 |
| Male | Ø | Weight/length (gm/cm) | 66.Ø ± 1.2 (49.Ø-81.5) | 66.4 | -.24 | 4Ø.5 | 42 |
| Male | Ø | Skinfolds sum (mm) | 12.6 ± .3 (9.Ø-18.Ø) | 12.4 | -- | -- | 41 |
| Male | 36 | Weight (kg) | 14.92 ± .34 (12.Ø-21.Ø) | 15.Ø | .16 | 56.4 | 33 |
| Male | 36 | Length (cm) | 94.5 ± .6 (86.5-1Ø2.Ø) | 95.Ø | -.1Ø | 46.1 | 33 |
| Male | 36 | Weight/length (gm/cm) | 157.6 ± 3.3 (128.Ø-224.Ø) | 155.5 | .38 | 64.9 | 33 |
| Male | 36 | Skinfolds sum (mm) | 28.Ø ± 2.2 (18.5-76.5) | 24.7 | -- | -- | 27 |

*For ease of reading values except weight were rounded to one decimal place. When followed by five even numbers remained the same while odd numbers were rounded up. Range variables were rounded to the nearest half.

Figure 2 on page 96 and its companion Table 12 on page 97 demonstrate that the 84 children drawn from the larger longitudinal population are close to that group's means of attained growth in weight, length, weight/length and skinfolds sum for each six-month measurement and that the 84 subjects are not an anthropometrically skewed subset of the larger population. Mean Z-scores of this study's children, calculated using the larger population's attained growth means and standard deviations, deviate less that .2Ø from zero, the population's overall mean Z-score.

Turning to growth velocity parameters the means and standard deviations of the intraindividually calculated growth percent gains and the interindividual growth change Z-scores are graphed in Figures 3 and 4 and listed in Table 13 on page 98, 99, and 1ØØ respectively. The first six months of life demonstrate in Figure 3 the largest percent gain in both weight/length and skinfolds sum than all later periods. Note that the skinfolds sum percent gain from 6 th 12 months is slightly negative indicating that most children either maintained their level of fatness or became leaner. All later periods showed little if any increase in body proportion or fatness levels. The distribution of growth change Z-scores in Figure 4 demonstrate, as in Figure 2 on page 96, that this subset's mean changes compared to the larger population averages are similar within .2 Z of the overall mean change. Medians in Table 13 show that a little over half (15 of 24) of all

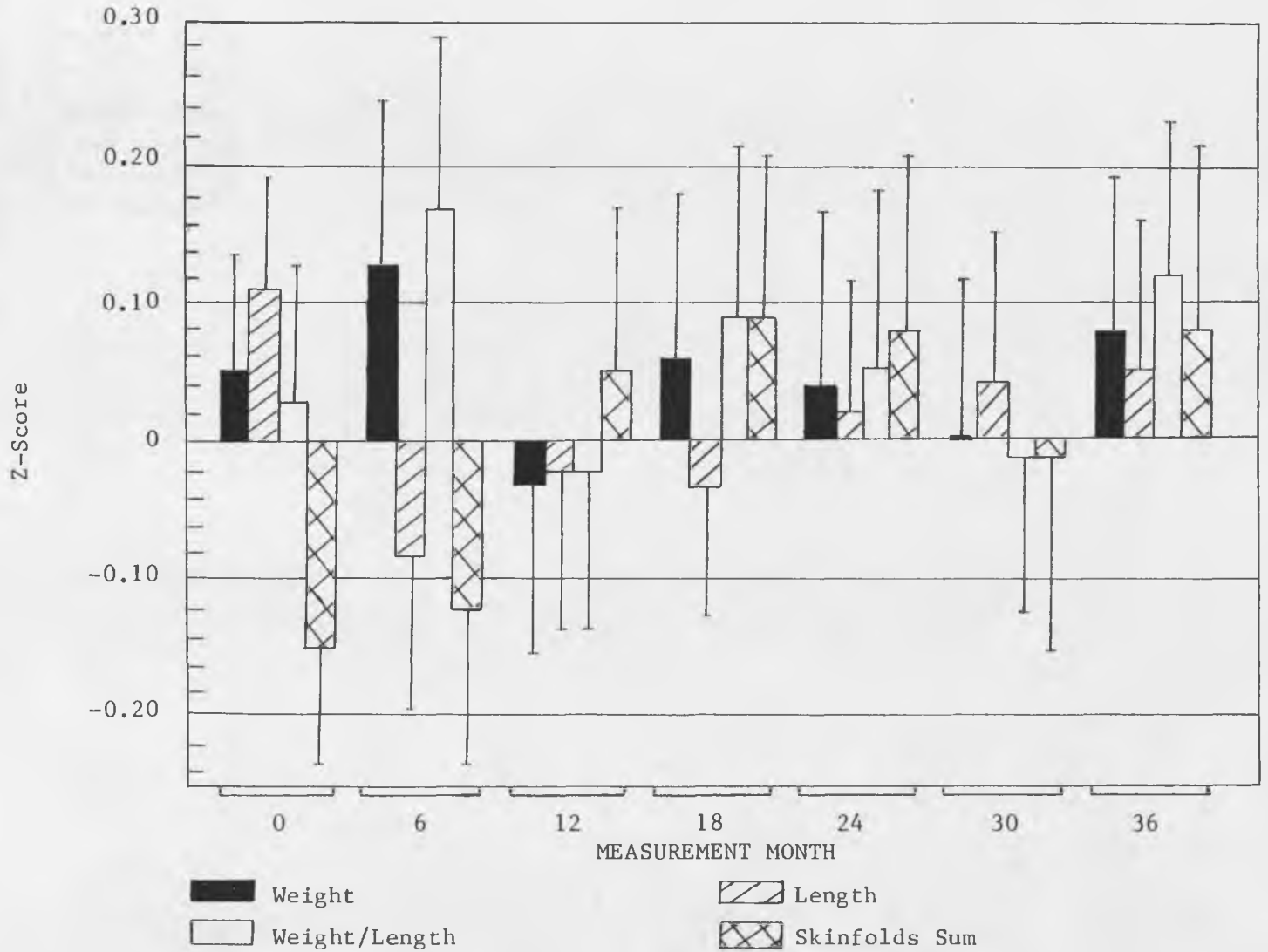



Figure 2. Means and Standard Deviations of Anthropometric Z-Scores at Each Measurement Period

## Table 12.

Mean, Standard Deviation, Range, and Median of Z-scores of Adjusted Raw Anthropometric Data per Six-Month Measurement

| Measure | Measurement Month | Mean ± SD (Range) | Median | N |
|---|---|---|---|---|
| Weight | Ø | .Ø5 ± .Ø9 (-1.9 to 1.6) | .1Ø | 84 |
| | 6 | .13 ± .13 (-2.Ø to 3.3) | .Ø6 | 69 |
| | 12 | -.Ø3 ± .12 (-2.2 to 4.7) | -.13 | 81 |
| | 18 | .Ø6 ± .12 (-2.1 to 5.5) | -.17 | 8Ø |
| | 24 | .Ø4 ± .12 (-1.7 to 5.1) | -.1Ø | 83 |
| | 3Ø | .ØØ ± .12 (-1.9 to 3.9) | .Ø5 | 74 |
| | 36 | .Ø8 ± .12 (-1.9 to 3.4) | -.Ø8 | 72 |
| Length | Ø | .11 ± .Ø9 (-2.3 to 2.3) | .14 | 84 |
| | 6 | -.Ø8 ± .12 (-2.9 to 2.9) | -.13 | 7Ø |
| | 12 | -.Ø2 ± .12 (-3.8 to 2.6) | .15 | 82 |
| | 18 | -.Ø3 ± .1Ø (-2.3 to 2.1) | .Ø7 | 8Ø |
| | 24 | .Ø2 ± .1Ø (-2.9 to 2.Ø) | -.Ø2 | 8Ø |
| | 3Ø | .Ø4 ± .11 (-1.9 to 1.9) | .ØØ | 73 |
| | 36 | .Ø5 ± .11 (-2.5 to 2.Ø) | .Ø4 | 71 |
| Weight/Length | Ø | .Ø3 ± .1Ø (-2.2 to 2.2) | .Ø6 | 84 |
| | 6 | .17 ± .13 (-1.8 to 4.2) | .14 | 69 |
| | 12 | -.Ø2 ± .12 (-1.5 to 5.2) | -.12 | 79 |
| | 18 | .Ø9 ± .13 (-2.3 to 5.5) | -.17 | 77 |
| | 24 | .Ø5 ± .13 (-1.7 to 6.Ø) | -.1Ø | 79 |
| | 3Ø | -.Ø1 ± .13 (-1.8 to 4.6) | -.Ø2 | 72 |
| | 36 | .12 ± .12 (-1.8 to 4.2) | .Ø1 | 7Ø |
| Skinfolds Sum | Ø | -.15 ± .Ø9 (-1.5 to 3.6) | -.26 | 79 |
| | 6 | -.12 ± .12 (-1.8 to 3.2) | -.26 | 67 |
| | 12 | .Ø5 ± .12 (-2.3 to 3.3) | -.Ø4 | 82 |
| | 18 | .Ø9 ± .12 (-1.7 to 4.7) | -.12 | 83 |
| | 24 | .Ø8 ± .13 (-1.8 to 4.9) | -.Ø5 | 81 |
| | 3Ø | -.Ø1 ± .14 (-1.9 to 6.6) | -.33 | 69 |
| | 36 | .Ø8 ± .14 (-1.9 to 5.6) | -.2Ø | 65 |

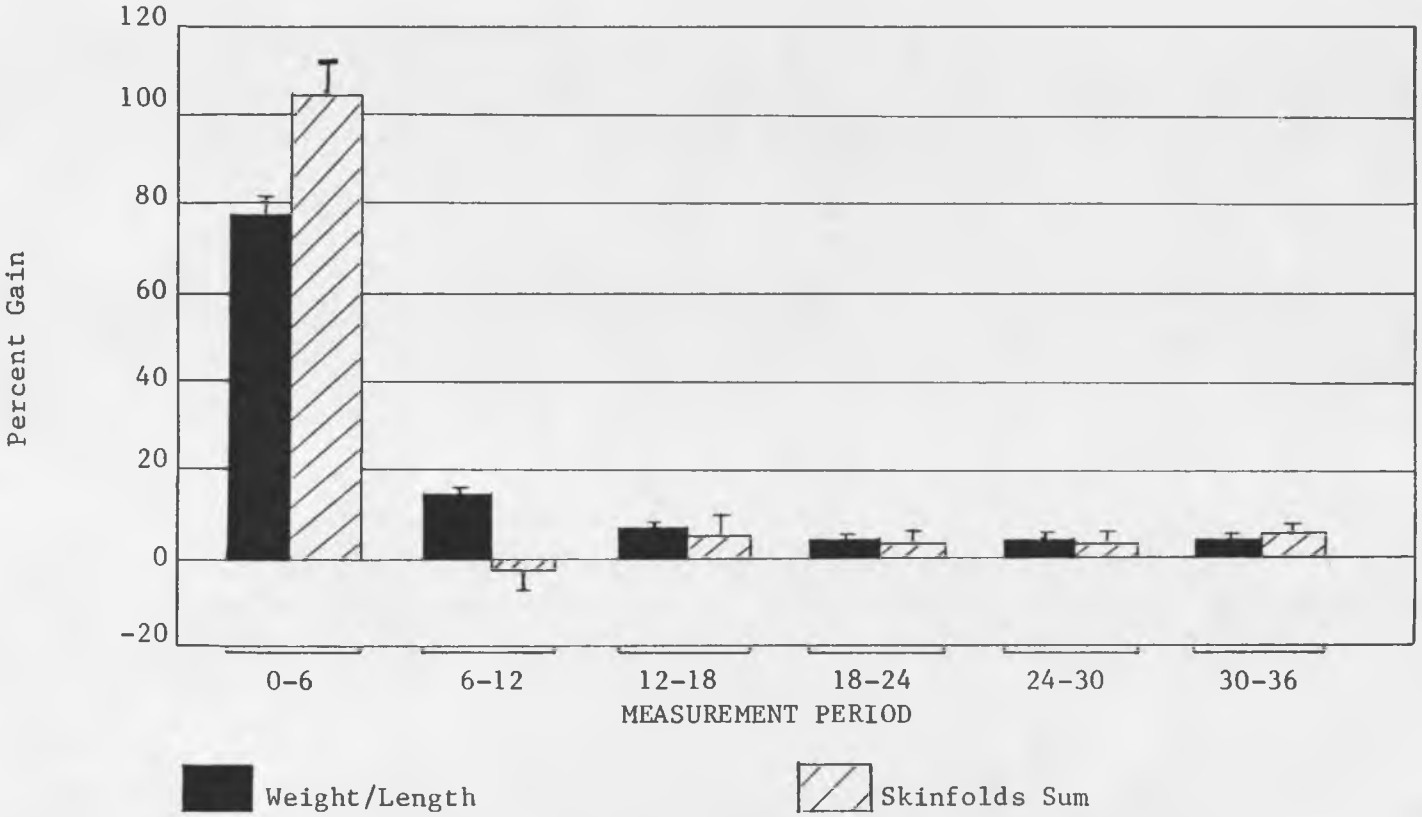



Figure 3. Means and Standard Deviations of Growth Percent Gains by Six-Month Intervals

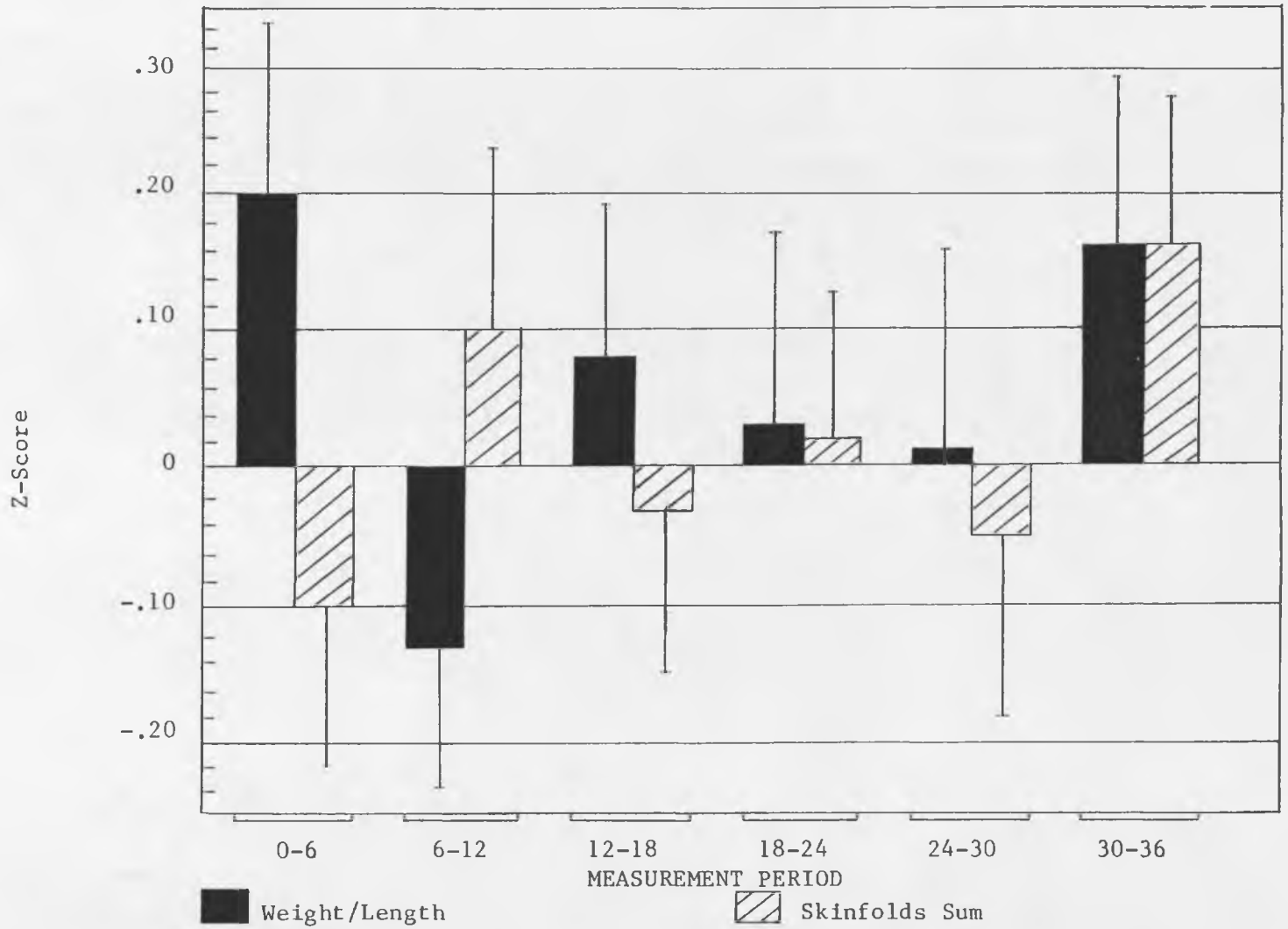



Figure 4. Means and Standard Deviations of Growth Change Z-Scores by Six-Month Intervals

Table 13.

Mean, Standard Deviation, Range, and Median of Percent Gains and Change Z-Scores Per Six Months on Weight/Length and Skinfolds

| Measure | 6-Month Period | Mean ± SD (Range) | Median | N |
|---|---|---|---|---|
| Weight/Length % Gain | 0-6 | 77.7 ± 3.4 (30.0 to 163.1) | 71.9 | 69 |
| | 6-12 | 14.1 ± 1.4 (-13.8 to 51.0) | 14.8 | 67 |
| | 12-18 | 6.4 ± 1.1 (-9.3 to 32.8) | 5.8 | 74 |
| | 18-24 | 3.9 ± 1.1 (-18.9 to 31.4) | 3.1 | 72 |
| | 24-30 | 3.9 ± .9 (-17.7 to 23.2) | 3.1 | 68 |
| | 30-36 | 3.4 ± .9 (-13.2 to 23.4) | 3.5 | 70 |
| Weight/Length Change Z | 0-6 | .20 ± .13 (-2.0 to 3.2) | .02 | 69 |
| | 6-12 | -.13 ± .11 (-2.5 to 2.1) | -.05 | 67 |
| | 12-18 | .08 ± .11 (-1.7 to 2.3) | .10 | 74 |
| | 18-24 | .03 ± .13 (-2.7 to 3.3) | -.02 | 72 |
| | 24-30 | .01 ± .14 (-3.6 to 3.7) | -.17 | 68 |
| | 30-36 | .16 ± .13 (-2.4 to 3.3) | .22 | 70 |
| Skinfolds Sum % Gain | 0-6 | 105.4 ± 6.6 (0.6 to 242.1) | 97.2 | 67 |
| | 6-12 | -1.5 ± 2.8 (-45.3 to 68.7) | -4.9 | 65 |
| | 12-18 | 5.5 ± 2.8 (-29.6 to 146.9) | 2.1 | 81 |
| | 18-24 | 2.6 ± 2.2 (-42.3 to 50.8) | 1.6 | 80 |
| | 24-30 | 2.4 ± 2.0 (-33.6 to 50.6) | -.5 | 67 |
| | 30-36 | 4.5 ± 1.7 (-26.2 to 41.4) | 5.3 | 65 |
| Skinfolds Sum Change Z | 0-6 | -.10 ± .12 (-1.9 to 2.7) | -.29 | 67 |
| | 6-12 | .10 ± .14 (-3.1 to 2.6) | .15 | 65 |
| | 12-18 | -.03 ± .12 (-2.0 to 3.9) | -.16 | 81 |
| | 18-24 | .02 ± .11 (-3.5 to 2.0) | .06 | 80 |
| | 24-30 | -.05 ± .13 (-3.0 to 4.8) | -.21 | 67 |
| | 30-36 | .16 ± .11 (-2.6 to 2.4) | .18 | 65 |

percent gain and change Z-scores per six months are skewed slightly to the left of the means. Examination of all frequency counts revealed a normal and continuous distribution of values.

Incremental weight and length charts by Roche and Himes (1980) were used to classify growth into eight percentile groups shown progressively over all six measurement periods in Figures 5 and 6 beginning on pages 102 and 104. Both weight and length gain percentile distributions appear normal during the first 6 months but rapidly flatten after that period. Only for weight gain is a return to normal distribution evidenced at 30 to 36 months, see Figure 5(f). Due to low cell sizes for some percentile groups, the eight categories were clumped into three units, low, medium and high gainers, as shown in Figures 7 and 8 on page106 and 107. In these graphs, as in Figures 5 and 6, the equal if not greater representation of low and high gainers compared to medium gainers is clearly shown after the first six-month period.

In Table 14, page 108, all unclumped weight gain percentile groups of those 51 children with complete weight data are presented along with the number of adjacent compensatory weight changes at greater than or equal to 80 or 65 percentile markers. Over the three year period shown a compensatory weight change occurred if the difference between the weight gain percentiles of two adjacent six-month intervals were 65, 80 or more percentile units. Figure 9 on page 109 graphs the percent distribution of extreme and aberrant weight changes as defined in the legend below

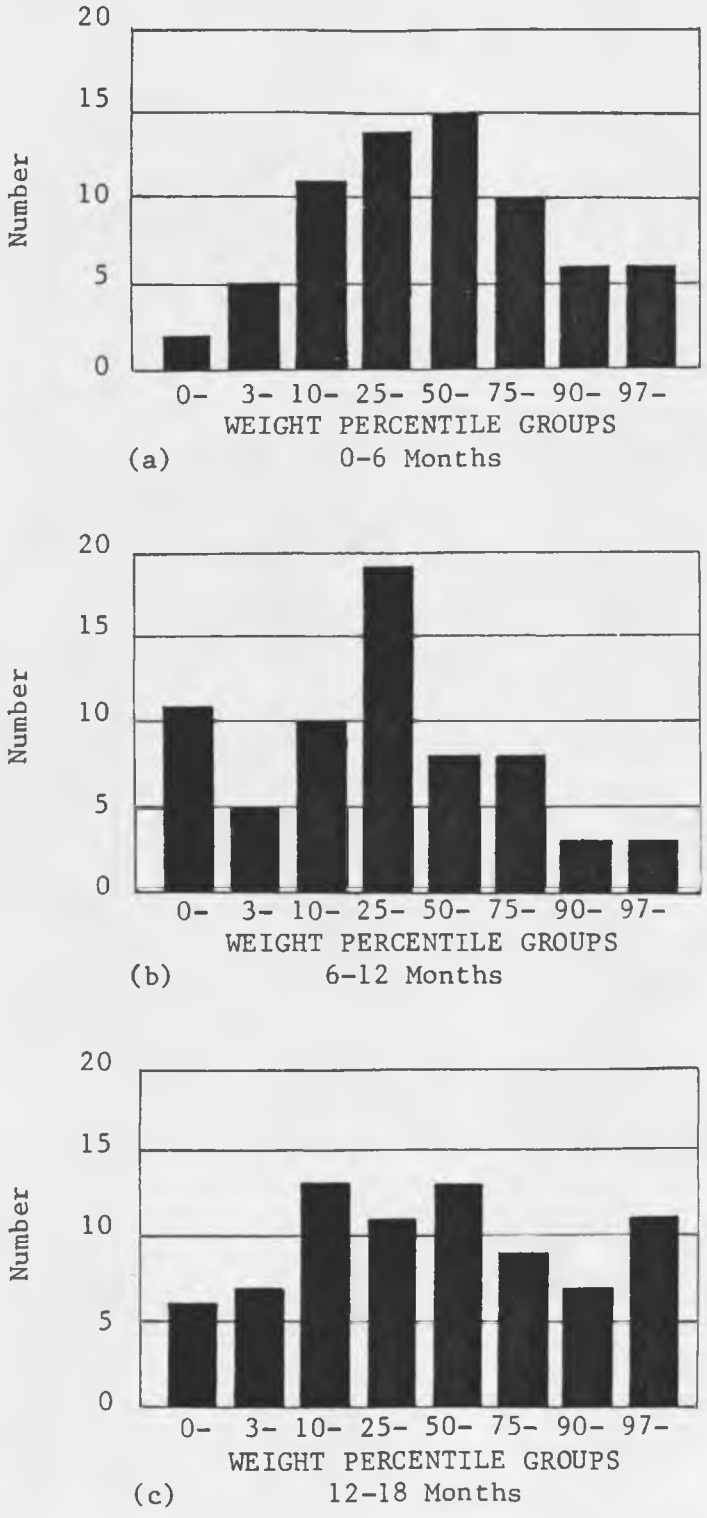
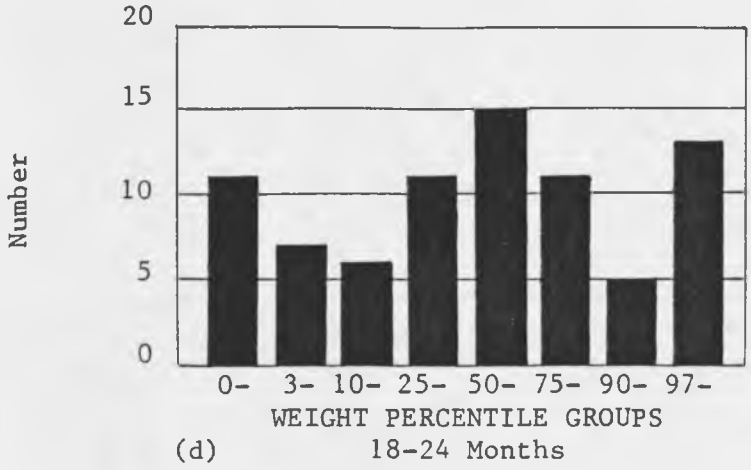
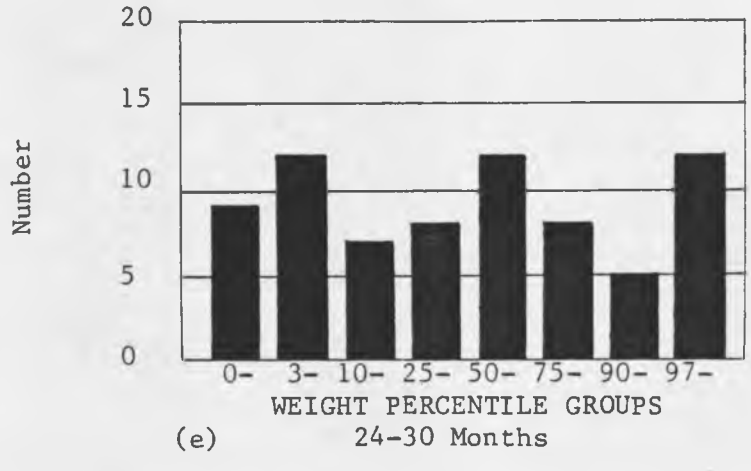


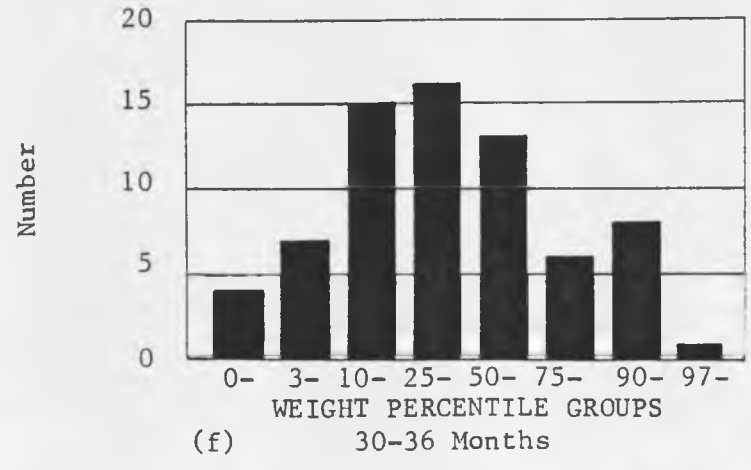

Figure 5. Frequency Distributions of Weight Gain Percentile Groups by Six-Month Intervals




(d) 18-24 Months




(e) 24-30 Months




(f) 30-36 Months

Figure 5--Continued

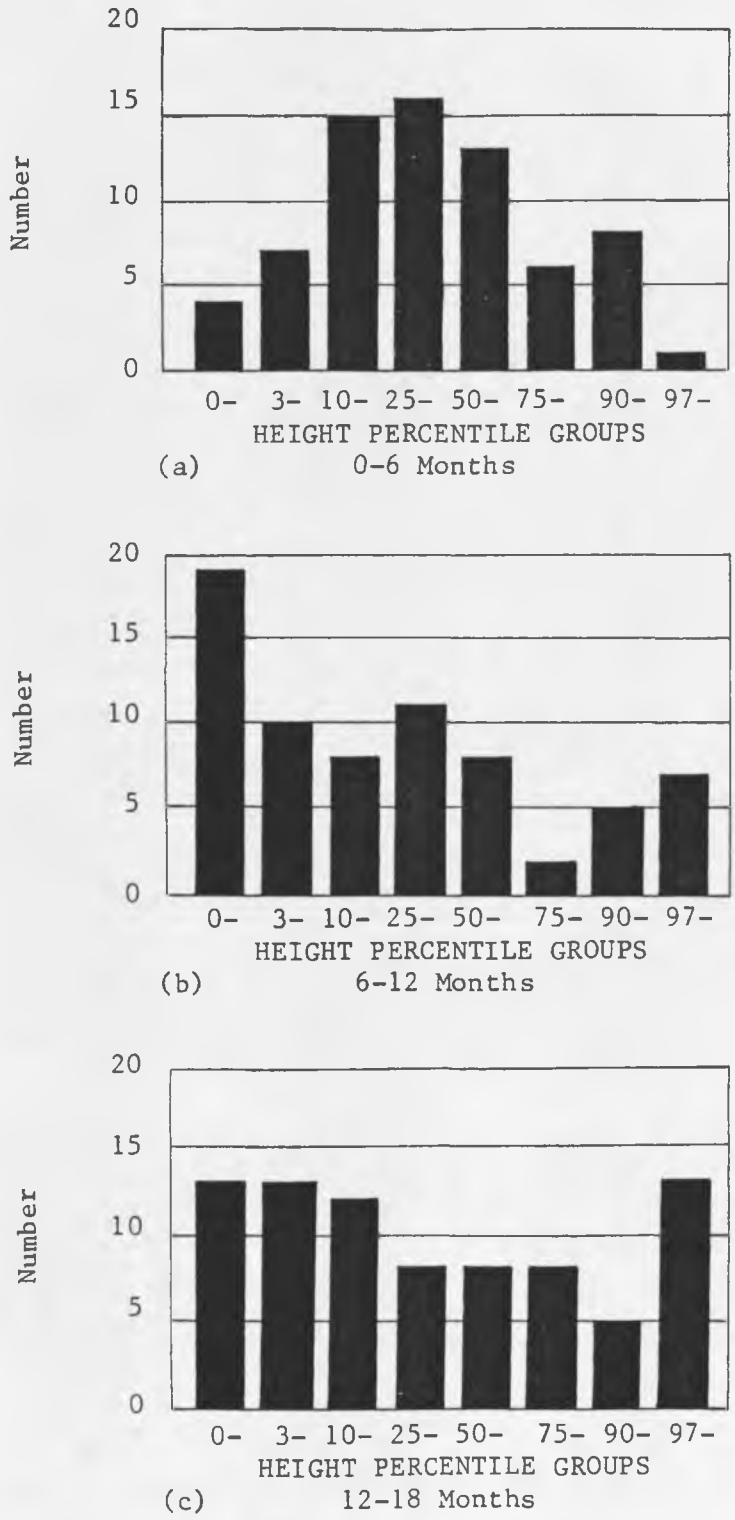
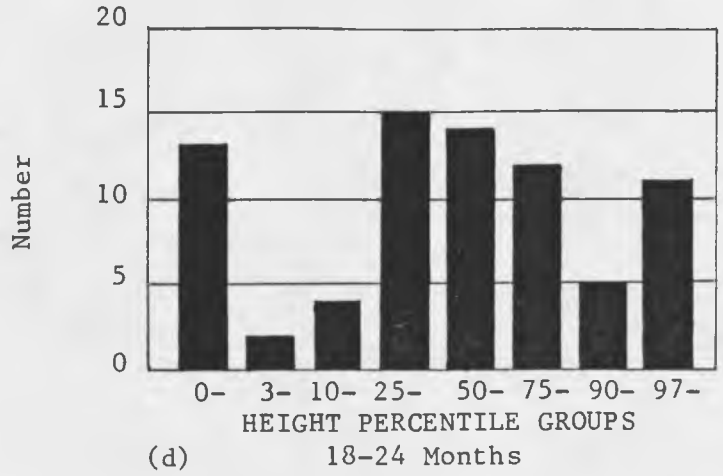
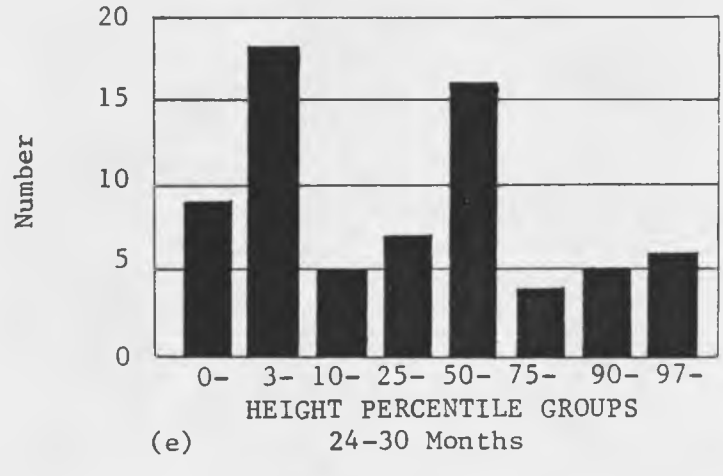


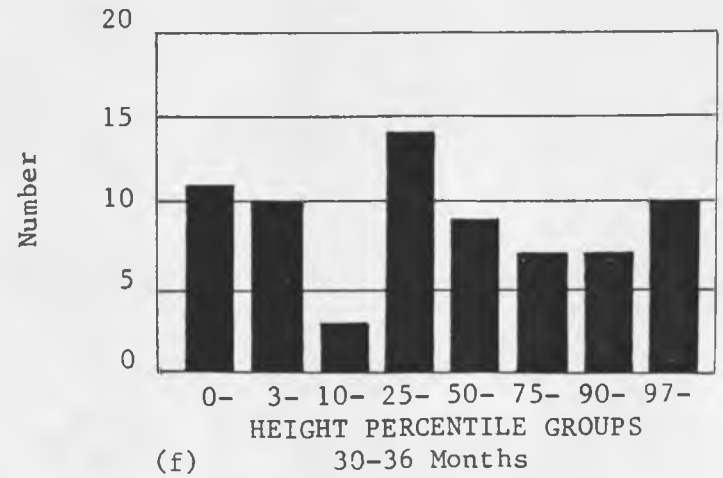

Figure 6. Frequency Distributions of Height Gain Percentile Groups by Six-Month Intervals




(d) 18-24 Months




(e) 24-30 Months




(f) 30-36 Months

Figure 6--Continued

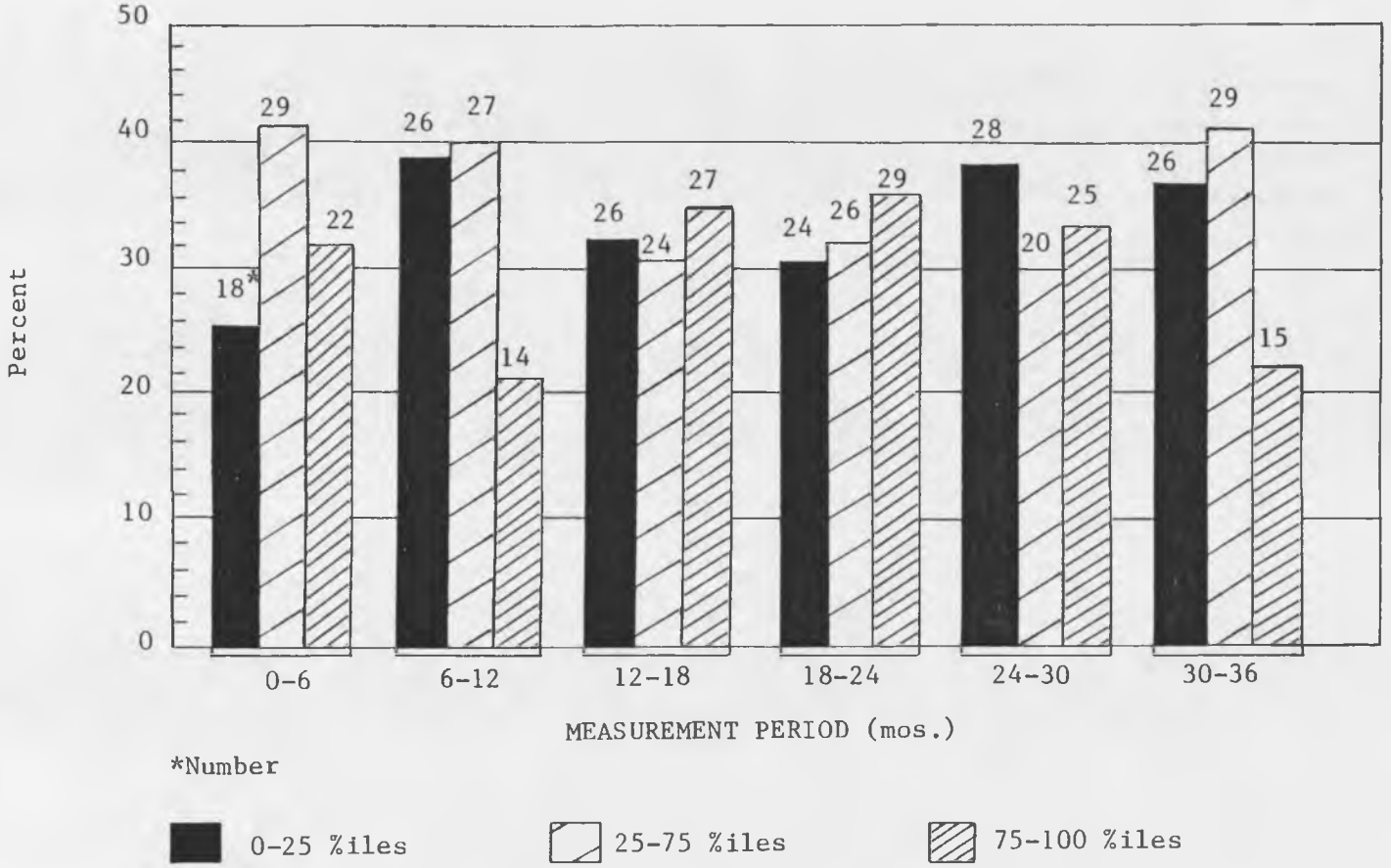



Figure 7. Percent Distribution of Clumped Weight Gain Percentile Groups by Six-Month Intervals

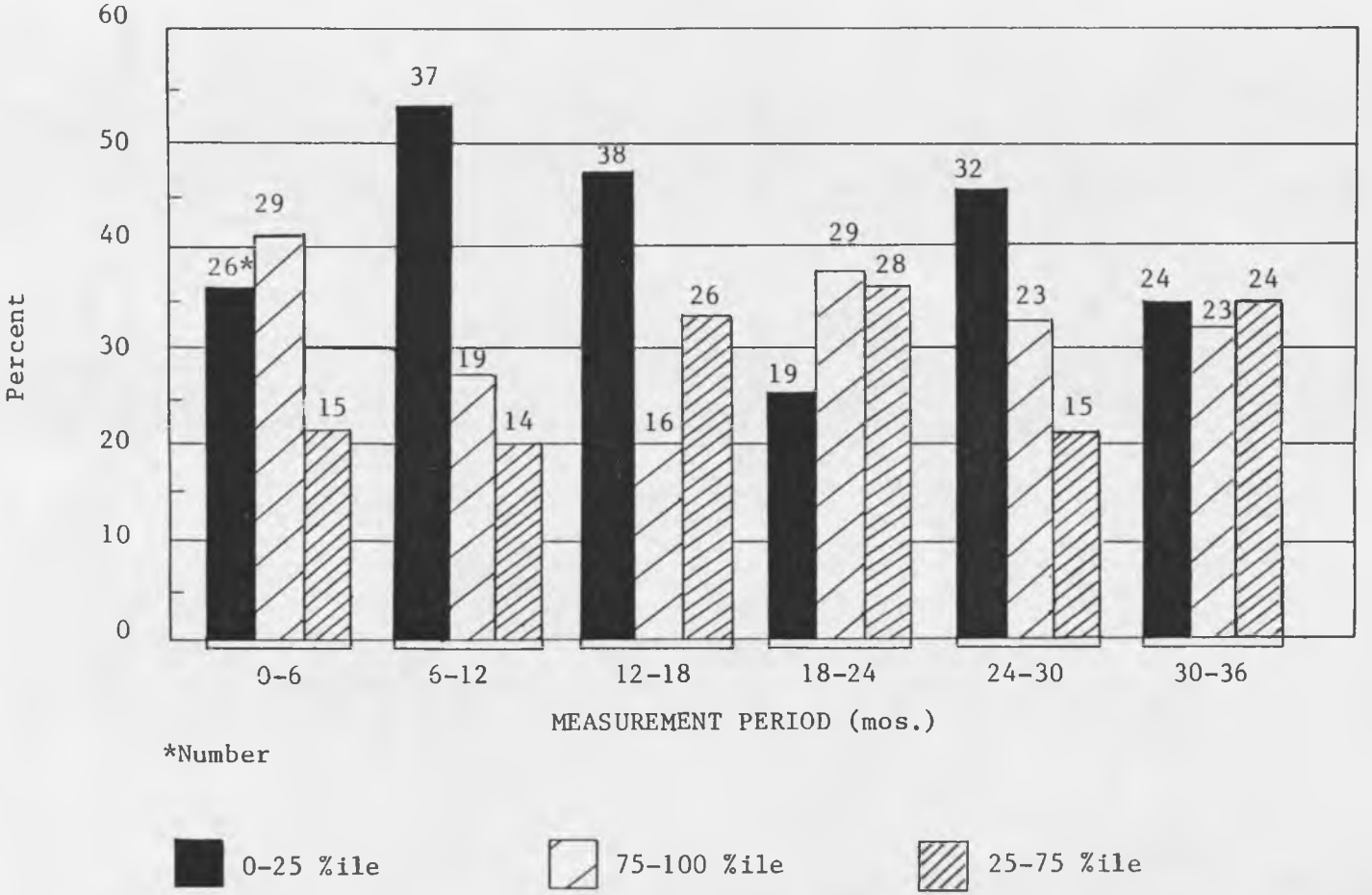



Figure 8. Percent Distribution of Clumped Height Gain Percentile Groups by Six-Month Intervals

**Table 14.**

Weight Gain Percentiles for 6-Month Intervals
and Number of Adjacent Compensatory Changes
for All Children With Complete Weight Data
N = 51

| ID | Period 0-6 | Period 6-12 | Period 12-18 | Period 18-24 | Period 24-30 | Period 30-36 | Number of Adjacent Compensatory Changes >80% | >65% |
|---|---|---|---|---|---|---|---|---|
| 448 | 5 | 1 | 5 | 5 | 5 | 5 | 0 | 0 |
| 457 | 2 | 7 | 6 | 2 | 2 | 7 | 2 | 3 |
| 460 | 2 | 1 | 7 | 5 | 6 | 8 | 1 | 1 |
| 466 | 5 | 4 | 4 | 1 | 2 | 6 | 0 | 1 |
| 490 | 6 | 5 | 3 | 5 | 3 | 8 | 0 | 1 |
| 493 | 4 | 5 | 3 | 7 | 2 | 8 | 2 | 3 |
| 496 | 7 | 6 | 3 | 6 | 5 | 4 | 0 | 0 |
| 544 | 5 | 6 | 4 | 5 | 4 | 3 | 0 | 0 |
| 552 | 5 | 1 | 6 | 6 | 5 | 8 | 0 | 1 |
| 553 | 8 | 1 | 2 | 4 | 8 | 6 | 1 | 1 |
| 554 | 6 | 1 | 4 | 4 | 5 | 8 | 0 | 1 |
| 560 | 8 | 3 | 6 | 2 | 6 | 8 | 0 | 3 |
| 564 | 4 | 5 | 5 | 8 | 4 | 8 | 0 | 0 |
| 566 | 1 | 8 | 3 | 4 | 2 | 8 | 2 | 3 |
| 568 | 6 | 1 | 4 | 4 | 2 | 8 | 1 | 2 |
| 576 | 3 | 5 | 7 | 2 | 8 | 1 | 3 | 3 |
| 582 | 4 | 4 | 3 | 7 | 3 | 8 | 0 | 3 |
| 596 | 5 | 2 | 7 | 4 | 7 | 5 | 1 | 1 |
| 612 | 6 | 3 | 4 | 3 | 8 | 1 | 1 | 2 |
| 619 | 8 | 1 | 4 | 1 | 7 | 1 | 3 | 3 |
| 624 | 3 | 4 | 8 | 1 | 7 | 1 | 3 | 3 |
| 625 | 5 | 7 | 2 | 2 | 5 | 3 | 1 | 1 |
| 909 | 3 | 3 | 4 | 5 | 8 | 1 | 1 | 1 |
| 920 | 7 | 3 | 6 | 5 | 8 | 1 | 1 | 2 |
| 922 | 4 | 4 | 6 | 5 | 5 | 1 | 0 | 0 |
| 926 | 8 | 7 | 3 | 3 | 8 | 1 | 1 | 3 |
| 937 | 3 | 8 | 1 | 4 | 2 | 4 | 1 | 2 |
| 949 | 4 | 3 | 5 | 5 | 1 | 4 | 0 | 0 |
| 968 | 5 | 5 | 1 | 8 | 4 | 3 | 1 | 1 |
| 969 | 3 | 3 | 1 | 5 | 8 | 2 | 1 | 1 |
| 971 | 3 | 4 | 4 | 6 | 2 | 5 | 0 | 1 |
| 976 | 5 | 6 | 1 | 3 | 8 | 1 | 1 | 3 |
| 982 | 5 | 4 | 3 | 6 | 6 | 1 | 0 | 1 |
| 983 | 7 | 4 | 4 | 8 | 7 | 1 | 1 | 1 |
| 990 | 6 | 4 | 3 | 3 | 5 | 7 | 0 | 0 |
| 993 | 3 | 6 | 3 | 6 | 4 | 8 | 0 | 0 |
| 1001 | 4 | 3 | 3 | 6 | 2 | 4 | 0 | 1 |
| 1002 | 5 | 3 | 4 | 5 | 3 | 6 | 0 | 0 |
| 1005 | 4 | 2 | 5 | 3 | 6 | 6 | 0 | 0 |
| 1009 | 1 | 3 | 2 | 8 | 1 | 5 | 2 | 2 |
| 1041 | 6 | 4 | 8 | 8 | 8 | 3 | 0 | 1 |
| 1053 | 3 | 6 | 5 | 6 | 5 | 7 | 0 | 0 |
| 1066 | 3 | 4 | 7 | 8 | 1 | 2 | 1 | 1 |
| 1068 | 4 | 4 | 3 | 8 | 2 | 1 | 1 | 2 |
| 1069 | 5 | 6 | 8 | 1 | 1 | 4 | 1 | 1 |
| 1092 | 6 | 5 | 8 | 1 | 4 | 4 | 1 | 1 |
| 1097 | 4 | 2 | 6 | 5 | 5 | 4 | 0 | 1 |
| 1098 | 2 | 4 | 5 | 1 | 3 | 3 | 0 | 0 |
| 1325 | 4 | 4 | 3 | 7 | 3 | 6 | 0 | 2 |
| 1326 | 7 | 1 | 8 | 5 | 8 | 6 | 2 | 2 |
| 1328 | 4 | 4 | 6 | 6 | 5 | 5 | 0 | 0 |

Weight Percentile Key: 1 = $\leq$ 3%; 2 = 3-10%; 3 = 10-25%;
4 = 25-50%; 5 = 50-75%; 6 = 75-90%;
7 = 90-97%; 8 = $\geq$ 97%

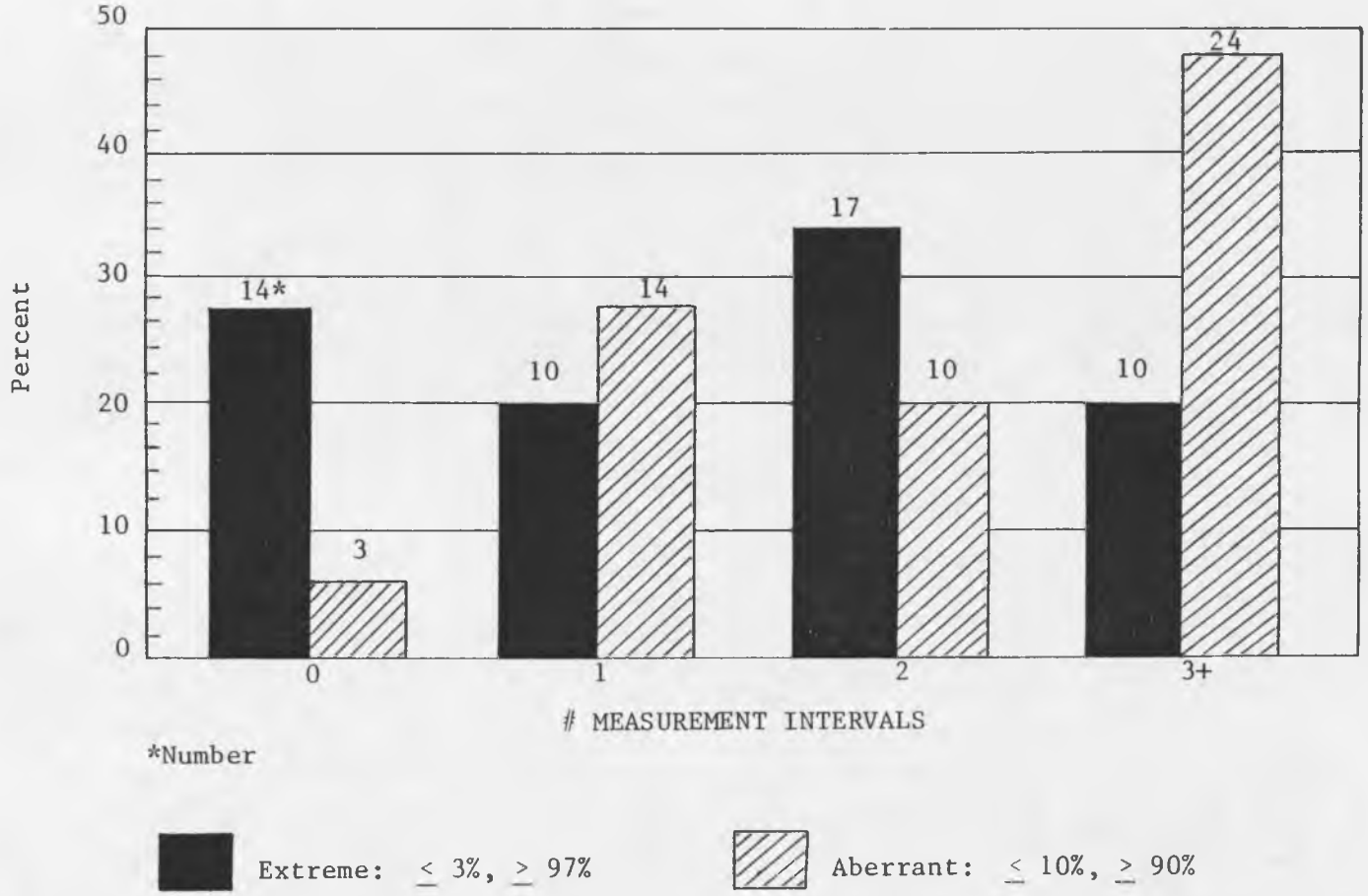



Figure 9. Percent Distribution of Extreme/Aberrant Weight Gains of Children with Complete Weight Data, N = 51

the histogram. Of these 51 children only 27% did not have an extreme growth period and only 6% did not exhibit an aberrant change. When looking for adjacent compensatory growth changes through similar but opposite aberrant weight gains, as seen in the 80 percentile wide changes in Figure 10 on page 111 close to half of all 51 children demonstrate these changes. However, if compensator weight changes are relaxed to include down to 65 percentile markers almost 75% of children display such high and low gains. When children did not present compensatory weight gain changes during the three years one of two patterns were revealed instead. Either the child fairly steadily maintained his or her percentile gains or gently eased from one extreme to the other without any sudden shifts.

The three male and three female subjects from families with at least one non-Anglo or non-Mexican American parent were examined by their weight/length and skinfolds sum change Z-scores. Twenty-one of 28 (75%) weight/length change Z-scores and 14 of 26 (54%) skinfolds sum change Z-scores were above the 50th percentiles in the frequency distributions of all 84 children for each growth parameter over all measurement periods (see Table 15 on page 112). Even though these children appeared to be high weight gainers they were included in all computations since each child's growth was compared to his or her own family variables as an intraindividual and not as an interindividual comparison.

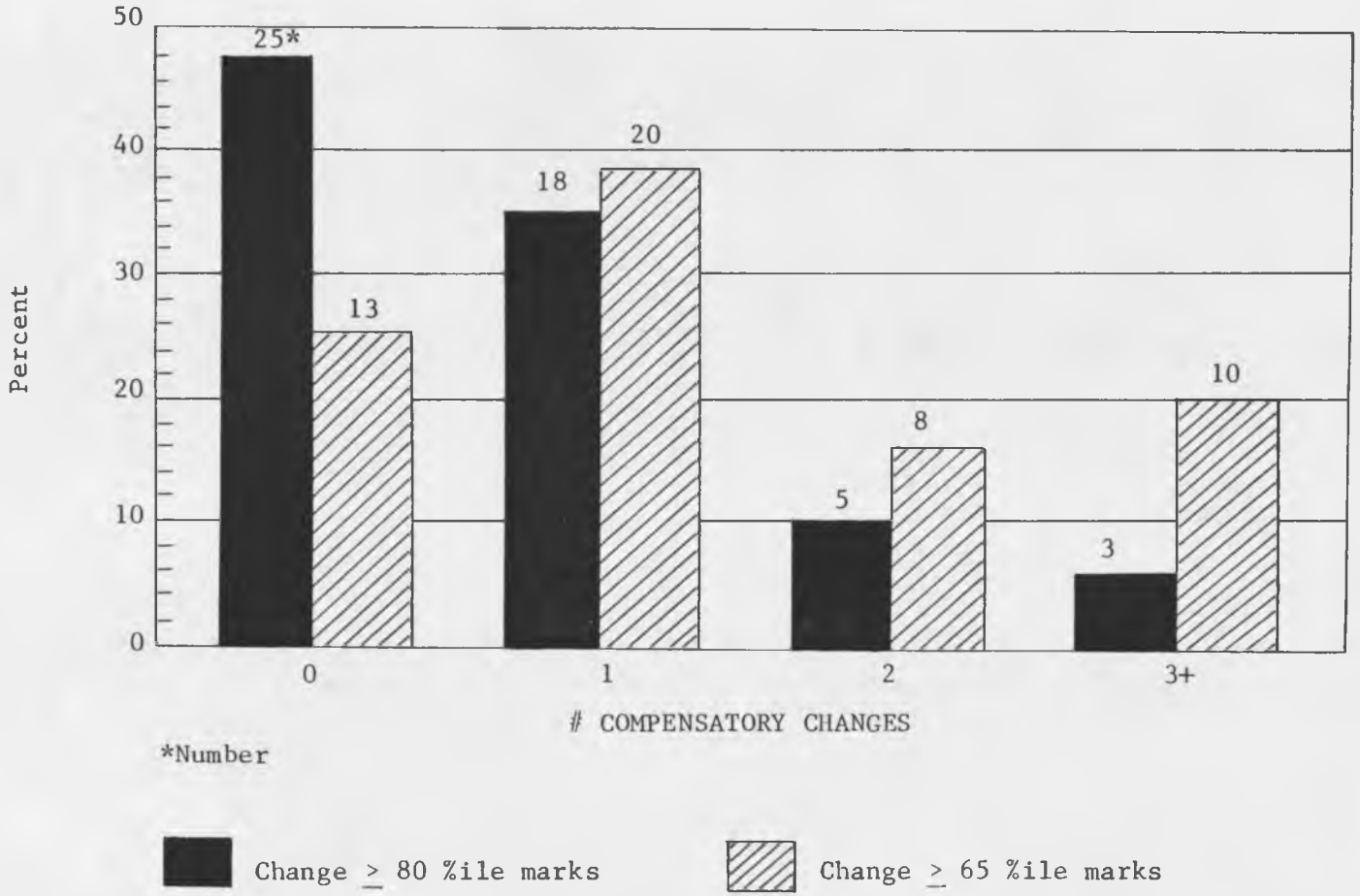



Figure 10. Percent Distribution of the Number of Adjacent Compensatory Weight Gain Changes Over Three Years, N = 51

## Table 15.

Percentile Distribution of Weight/Length Change Z-Scores and Skinfolds Sum Change Z-Scores of Children with at Least One Parent Non-Anglo or Non-Mexican American

| Measurement Interval (mos) for Wt/Lt Change Z-Scores | 310 Female | 595 Male | 1041 Male | 1150 Female | 1164 Male | 1328 Female |
|---|---|---|---|---|---|---|
| 0-6 | | 70 | 62 | | | 54 |
| 6-12 | | 42 | 63 | | | 61 |
| 12-18 | 96 | 3 | 92 | 99 | 89 | 43 |
| 18-24 | 11 | 88 | 96 | 8 | 6 | 74 |
| 24-30 | 75 | | 100 | 20 | 82 | 50 |
| 30-36 | 74 | | 14 | 51 | 73 | 66 |
| **Measurement Interval (mos) for Skinfolds Sum Change Z-Score** | | | | | | |
| 0-6 | | 81 | 43 | | | 25 |
| 6-12 | | 57 | 97 | | | 66 |
| 12-18 | 25 | 7 | 100 | 47 | 68 | 35 |
| 18-24 | 25 | 80 | 83 | | 88 | 68 |
| 24-30 | 42 | | 100 | | 97 | 52 |
| 30-36 | 74 | | 2 | 9 | 32 | 42 |

Reference was made in the literature review to the first six months of life exhibiting more catch up and fall back growth to reach a genetic growth percentile channel than in later months. To test whether the population frequency distribution of the changes occurring in the first six months did or did not match the pattern seen in the remaining two and one-half years, correlation coefficients between Ø to 6 and 6 to 36 month weight, length, weight/length and skinfolds sum percent gains were run and recorded in Table 16 seen on page 114. Only skinfolds sum demonstrates a consistent pattern of growth whereas weight, length, and weight/length parameters do not show sufficiently high correlations to reveal strong relationships. Only 11% of the variation between Ø to 6 and 6 to 36 months is predicted by weight and weight/length and even less by length. Therefore, since different growth pattern surfaced for the three and two and one-half summaries, both were compared to summary family variables in hypothesis testing correlations.

Finally, ANOVA's of ethnicity effects on two and one-half and three year growth changes showed no significant relationships.

Figure 11 on page 115 summarizes mother's weight/height gains over the three years. As usual, mothers lost weight to decrease the mean weight/height ratio from birth to the six month measurement.

**Table 16.**

Correlation Coefficients of 2 and 1/2-Year Growth Changes vs. 3-Year Growth Changes

| Factors (% gains) Ø-36 vs. 6-36 months | Correlation Coefficient | N |
|---|---|---|
| Weight | .33* | 58 |
| Length | (.2Ø) | 57 |
| Weight/Length | .33* | 56 |
| Skinfolds Sum | .82** | 51 |

*$p \leq .Ø5$
**$p \leq .ØØ1$

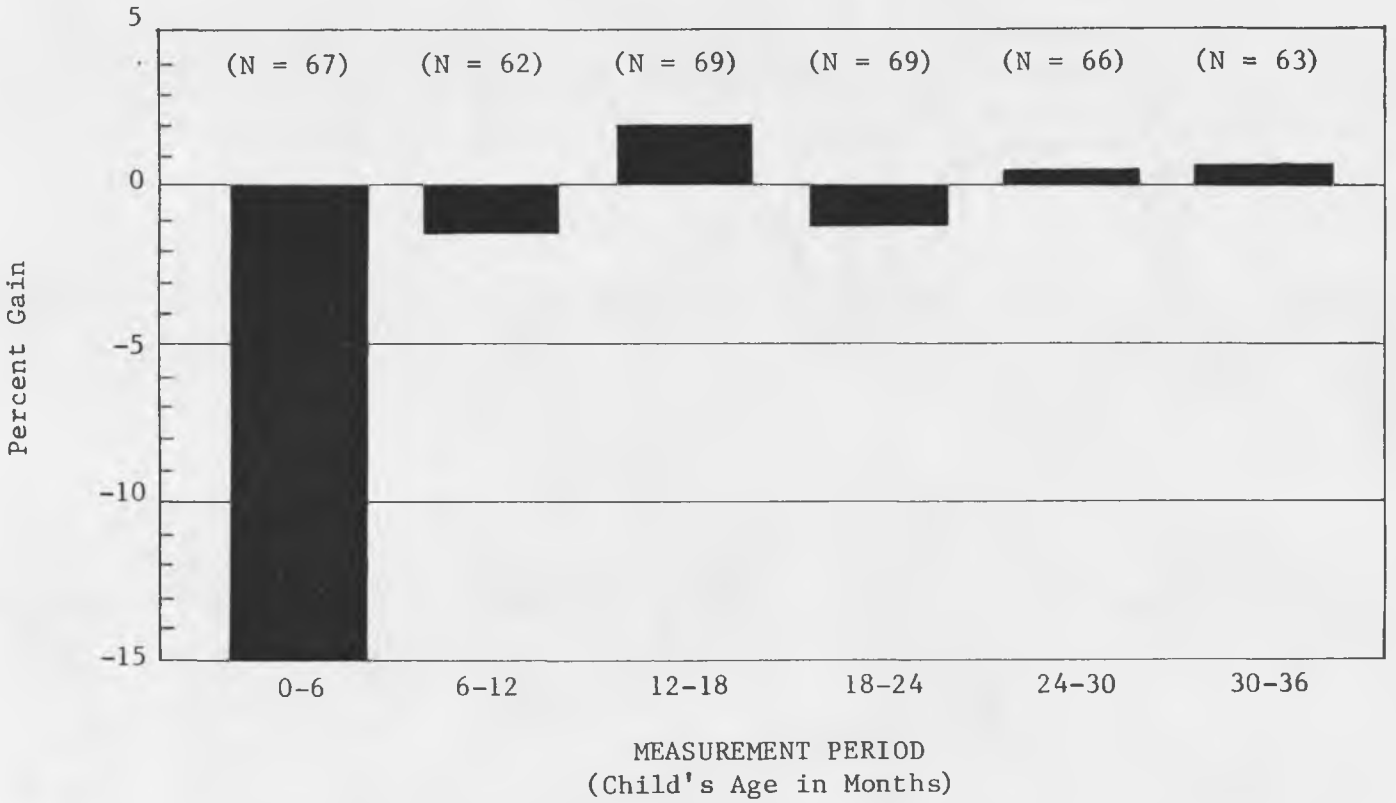



Figure 11. Means of Mothers' Weight/Height Percent Gains by Six-Month Measurement Periods

## Hypothesis Testing Statistics

### Growth versus Temperament and Satisfaction

Temperament as represented by the average of 5 BSQ scales revealed no association via correlation coefficients with weight/length and skinfolds sum percent gains or change Z-scores. Neither did analysis of variance between the 5 BSQ scales' average and weight or length gain percentile clumped groups (0-25, 25-75, 75-100) show any relationships. Chi-square analysis of behavioral styles versus all eight or three clumped weight and height gain percentile groups did not show anything, primarily because greater than 90% of all cells of unclumped percentiles and approximately 10% of cells with clumped growth data had expected frequencies under five.

Only when viewing F-ratios of behavioral style and weight/length and skinfolds sum percent gains and change Z-scores are any significant associations displayed. From 12 to 18 months children with intermediate temperament have greater weight/length percent gains and change Z-scores than both the easy and difficult subjects. At 18 to 24 months the skinfolds sum Z-score is smaller in the intermediate group than the other two styles. The opposite direction is seen at 30 to 36 months with both skinfolds sum parameters being greater for the intermediate temperament.

Satisfaction by the total and family scales shows as few significant associations as the temperament scores displayed. Correlation coefficients of total and family satisfaction with

weight/length and skinfolds sum percent gains and Z-scores showed only at 12 to 18 months that both satisfactions had significant ($p \leq .05$, $p \leq .01$) positive correlations for weight/length percent gains and change Z-scores. Analysis of variance between satisfaction and weight and length gain clumped percentile groups showed nothing significant.

**Growth Versus Support**

Table 17 on page 118 summarizes all 6-month periods of correlations between support factors and growth velocity while Table 18, pages 119 to 121, gives an expanded view. In Table 17 only change Z-scores were recorded since in Table 18 both percent gains and change Z-scores paralleled each other in most significant associations. Only one negative correlation surfaced out of all the positive associations in Table 17. Primarily skinfold sum changes are significant during the first two growth periods. A fairly quiet period occurs from 12 to 24 months and is followed by a burst of positive correlations in weight/ length at 24 to 30 months of age with network size and all those combined support factors which include network size in their formulations. The last period from 30 to 36 months again is relatively sparse of significant correlations.

As stated in Methods, children were separated by the presence or absence of a new sibling between ages 12 and 30 months to study any effects of family structural changes and child status

**Table 17.**

Significant Correlations of Support Variables per Six-Month Interval vs. Weight/Length and Skinfolds Sum Change Z-Scores per Six-Month Interval in All Children, and Children With or Without New Siblings From 12-30 Months[a]

| Six-Month Interval | 0-6 | | | | | | 6-12 | | | | | | 12-18 | | | | | | 18-24 | | | | | | 24-30 | | | | | | 30-36 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | All | | Sibs | | No Sibs | | All | | Sibs | | No Sibs | | All | | Sibs | | No Sibs | | All | | Sibs | | No Sibs | | All | | Sibs | | No Sibs | | All | | Sibs | | No Sibs | |
| Support Factor | W/L | S | W/L | S | W/L | S | W/L | S | W/L | S | W/L | S | W/L | S | W/L | S | W/L | S | W/L | S | W/L | S | W/L | S | W/L | S | W/L | S | W/L | S | W/L | S | W/L | S | W/L | S |
| Network Size | | | | | | | | | | ++ | | | | | | | | | | | | | | | ++ | | | | ++ | | | | | | | | |
| Average Contact Days/6 mos. | | + | | + | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Total Contact Days/6 mos. | | + | | ++ | | | | | | | | | | | + | | | | | | | | | | ++ | | | | ++ | | | | | | | |
| Ave. Emotional Support | | | | | | | | + | | | | + | | | | | | | | | + | | | | | | ++ | | | | + | | + | | + | |
| Total Emotional Support | | | | | | | | | | ++ | | | | | + | | | | | | | | | | + | | | | ++ | | | | | | | |
| Wt. Ave. Emotional Support | + | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Wt. Total Emotional Support | | + | | | | | | | | | | | | | + | | | | | | | | | | + | + | | | ++ | + | | | | | | |
| Average Physical Support | | | | | | | | | | | | | | | | | | | | | | - | | | | + | | | | | | | | | | |
| Total Physical Support | | | | | | | | | | + | | | | | | | | | | | | | | | +++ | | | | +++ | | | | | | | |
| Wt. Ave. Physical Support | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Wt. Total Physical Support | | | | + | | | | | | | | | | | + | | | | | | | | | | ++ | + | | | ++ | + | | | | | | |
| Average NSSQ Rating | | | | | | | | + | | | | + | | | | | | | | | | | | | | | | | | | + | | | | | |
| Total NSSQ Rating | | | | | | | | | | ++ | | | | | + | | | | | | | | | | ++ | | | | ++ | | | | | | | |
| Wt. Ave. NSSQ Rating | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Wt. Total Physical Support | | + | | | | | | | | | | | | | + | | | | | | | | | | ++ | + | | | ++ | + | | | | | | |
| N | 69 | 67 | 19 | 19 | 50 | 48 | 67 | 65 | 18 | 18 | 49 | 47 | 74 | 81 | 18 | 22 | 56 | 59 | 72 | 80 | 18 | 22 | 54 | 58 | 68 | 67 | 20 | 21 | 48 | 46 | 70 | 65 | 20 | 21 | 50 | 44 |

+ $p \leq .05$ positive correlation
++ $p \leq .01$ positive correlation
+++ $p \leq .001$ positive correlation
- $p \leq .05$ negative correlation
[a]W/L = Weight/Length
S = Skinfolds Sum

Table18

Correlation Coefficients of Growth Changes Per Six-Month Interval in All Children, Children With or Without New Siblings 12-30 Months vs. Support Per Six-Months

| | 0-6 Months | | | | | | | | | | | | 6-12 Months | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | All Children | | | | New Siblings | | | | No New Sibling | | | | All Children | | | | New Siblings | | | | No New Sibling | | | |
| | W/L % | W/L Z | SF % | SF Z | W/L % | W/L Z | SF % | SF Z | W/L % | W/L Z | SF % | SF Z | W/L % | W/L Z | SF % | SF Z | W/L % | W/L Z | SF % | SF Z | W/L % | W/L Z | SF % | SF Z |
| Network Size | | | | | | | | | | | | | | | | | | | ** .68 | ** .62 | | | | |
| Ave. Contact Days | | | ** .32 | * .30 | * .54 | | *** .69 | * .54 | | | | | | | | | | | | | | | | |
| Total Contact Days | | | * .27 | * .31 | | | ** .60 | ** .57 | | | | | | | | | | | | | | | | |
| Ave. Emotional Support | * .25 | | | | (-.20) | | | | * .33 | | | | | | * .26 | * .27 | | | (-.12) | (-.10) | | | * .33 | * .34 |
| Total Emotional Support | | | | | | | | | | | | | | | | | | | ** .65 | ** .61 | | | | |
| Wt. Ave. Emotional Support | | * .25 | | | * .46 | | * .46 | | | | | | | | | | | | | | | | | |
| Wt. Total Emotional Support | | | | * .25 | | | | | | | | | | | | | | | | | | | | |
| Ave. Physical Support | | | | | | | | | | | | | | | | | | | | | | | | |
| Total Physical Support | | | | | | | | | | | | | | | | | | | ** .62 | * .55 | | | | |
| Wt. Ave. Physical Support | | | | | | * .57 | | | | | | | | | | | | | | | | | | |
| Wt. Total Physical Support | | | | | | | * .52 | * .46 | | | | | | | | | | | | | | | | |
| Ave. NSSQ Rating | * .25 | | | | (.08) | | | | * .31 | | | | | | * .28 | * .25 | | | (-.06) | (-.08) | | | * .37 | * .31 |
| Total NSSQ Rating | | | | | | | | | | | | | | | | | | | ** .67 | ** .62 | | | | |
| Wt. Ave. NSSQ Rating | | | | | * .46 | | * .51 | | | | | | | | | | | | | | | | | |
| Wt. Total NSSQ Rating | | | | * .24 | | | * .50 | | | | | | | | | | | | | | | | | |
| N | 69 | 69 | 67 | 67 | 19 | 19 | 19 | 19 | 50 | 50 | 48 | 48 | 67 | 67 | 65 | 65 | 18 | 18 | 18 | 18 | 49 | 49 | 47 | 47 |

*p ≤ .05 **p ≤ .01 ***p ≤ .001

W/L = Weight/Length SF = Skinfolds Sum

Table 18--Continued

Correlation Coefficients of Growth Changes Per Six-Month Interval in All Children, Children With or Without New Siblings 12-30 Months vs. Support Per Six-Months

| | 12-18 Months | | | | | | | | | | | | 18-24 Months | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | All Children | | | | New Siblings | | | | No New Sibling | | | | All Children | | | | New Siblings | | | | No New Sibling | | | |
| | W/L % | W/L Z | SF % | SF Z | W/L % | W/L Z | SF % | SF Z | W/L % | W/L Z | SF % | SF Z | W/L % | W/L Z | SF % | SF Z | W/L % | W/L Z | SF % | SF Z | W/L % | W/L Z | SF % | SF Z |
| Network Size | | | | | | | | | | | | | | | | | | | | | | | | |
| Ave. Contact Days | | | | | | | | | | | | | | | | | | | | | | | | |
| Total Contact Days | | | | | | .47* | | | | | | | | | | | | | | | | | | |
| Ave. Emotional Support | | | | | | | | | | | | | | | | | .58* | .53* | | | | | | |
| Total Emotional Support | | | | | .55* | .51* | | | | | | | | | | | | | | | | | | |
| Wt. Ave. Emotional Support | | | | | | | | | | | | | | | | | | | | | | | | |
| Wt. Total Emotional Support | | | | | .52* | .56* | | | | | | | | | | | | | | | | | | |
| Ave. Physical Support | | | | | | | | | | | | | | | | | (.15) | (.09) | | | -.27* | -.28* | | |
| Total Physical Support | | | | | | | | | | | | | | | | | | | | | | | | |
| Wt. Ave. Physical Support | | | | | | | | | | | | | | | | | | | | | | | | |
| Wt. Total Physical Support | | | | | | .53* | | | | | | | | | | | | | | | | | | |
| Ave. NSSQ Rating | | | | | | | | | | | | | | | | | | | | | | | | |
| Total NSSQ Rating | | | | | .49* | .48* | | | | | | | | | | | | | | | | | | |
| Wt. Ave. NSSQ Rating | | | | | | | | | | | | | | | | | | | | | | | | |
| Wt. Total NSSQ Rating | | | | | .51* | .57* | | | | | | | | | | | | | | | | | | |
| N | 74 | 74 | 81 | 81 | 18 | 18 | 22 | 22 | 56 | 56 | 59 | 59 | 72 | 72 | 80 | 80 | 18 | 18 | 22 | 22 | 54 | 54 | 58 | 58 |

**Table 18--Continued**

Correlation Coefficients of Growth Changes Per Six-Month Interval in All Children, Children With or Without New Siblings 12-30 Months vs. Support Per Six-Months

| | 24-30 Months | | | | | | | | | | | | 30-36 Months | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | All Children | | | | New Siblings | | | | No New Sibling | | | | All Children | | | | New Siblings | | | | No New Sibling | | | |
| | W/L % | W/L Z | SF % | SF Z | W/L % | W/L Z | SF % | SF Z | W/L % | W/L Z | SF % | SF Z | W/L % | W/L Z | SF % | SF Z | W/L % | W/L Z | SF % | SF Z | W/L % | W/L Z | SF % | SF Z |
| Network Size | .31** | .32** | | | (.00) | (.04) | | | .42** | .41** | | | | | | | | | | | | | | |
| Ave. Contact Days | | | | | | | | | | | | | | | | | | | | | | | | |
| Total Contact Days | .33** | .33** | | | (.04) | (.10) | | | .42** | .40** | | | | | | | | | | | | | | |
| Ave. Emotional Support | | | | | -.61** | -.61** | | | | | | | .33** | .29* | | | (1) .49* | .45* | | | (1) .29* | | | |
| Total Emotional Support | .26* | .28* | | | (-.24) | (-.20) | | | .39** | .39** | | | | | | | | | | | | | | |
| Wt. Ave. Emotional Support | | | | | | | | | | | | | | | | | | | | | | | | |
| Wt. Total Emotional Support | .27* | .29* | | .25* | (-.16) | (-.11) | | (.09) | .39** | .39** | | .30* | | | | | | | | | | | | |
| Ave. Physical Support | | | | .25* | | | | | | | | | | | | | | | | | | | | |
| Total Physical Support | .38*** | .40*** | | | (.02) | (.07) | | | .49*** | .49*** | | | | | | | | | | | | | | |
| Wt. Ave. Physical Support | | | | | | | | | | | | | | | | | | | | | | | | |
| Wt. Total Physical Support | .32** | .33** | | .30* | (-.01) | (.02) | | (.19) | .42** | .41** | | .33* | | | | | | | | | | | | |
| Ave. NSSQ Rating | | | | | | | | | | | | | .30* | .28* | | | | | | | | | | |
| Total NSSQ Rating | .31** | .33** | | | (-.14) | (-.10) | | | .44** | .44** | | | | | | | | | | | | | | |
| Wt. Ave. NSSQ Rating | | | | | | | | | | | | | | | | | | | | | | | | |
| Wt. Total NSSQ Rating | .30* | .32** | | .28* | (-.12) | (-.06) | | (.13) | .41** | .41** | | .32* | | | | | | | | | | | | |
| N | 68 | 68 | 67 | 67 | 20 | 20 | 21 | 21 | 48 | 48 | 46 | 46 | 70 | 70 | 65 | 65 | 20 | 20 | 21 | 21 | 50 | 50 | 44 | 44 |

(1) by Fisher's Z the two coefficients are not significantly different from each other

shifts. A total of 29 children received new siblings during that period. Table 18 reveals that even before new siblings were born, at Ø to 6 months the cohort of children who in the future had new siblings displayed far different growth changes than the cohort which were not to have new siblings from 12 to 3Ø months. Throughout the table non-significant coefficients were added in the growth-support cells of the new sibling cohort that matched those cells of the no new siblings which displayed significant relationships. Since there were fewer numbers in the new sibling cohort than in its counterpart perhaps a correlation coefficient could be of similar magnitude for the new sibling group to that of the no new sibling children but not show statistical significance due to the low cohort number. Inserting the non-significant new sibling correlation coefficients documents that they all are truly meaningless in comparison with the no new sibling cohort. Therefore, all of the differences seen between the two cohorts are not due to sample size discrepancies. Apparently in Ø to 6 months the new siblings group contributes to the significant growth-support associations seen overall in the 84 children. This contribution is reversed in the 24 to 3Ø month period in which the no new siblings group is growth sensitive to support factors and the new siblings group shows no associations and does not contribute to the overall strength of the significant associations in all 84 subjects.

Computing F-ratios of weight gain percentile clumped groups versus the fifteen support factors results in several significant associations shown in Figures 12 (a) through (i) beginning on page 124. From Ø to 6 months weighted total emotional support and weighted total NSSQ rating is greater in the high gainers, 75-1ØØ%, than the low or medium gainers in figures (a) and (b). From 24 to 3Ø months, as in the correlation coefficients of Tables 17 and 18, only support factors which incorporate network size show significant patterns. At this point both the medium and high gainers display greater network size, total contact days, total emotional and physical supports, and total NSSQ rating than the low gainers. Finally, at 3Ø to 36 months the high gainers again have greater average emotional support and NSSQ rating than the low gainers with the medium cohort intermediate. All F-ratios from the other support variables failed to display significance. F-ratios of height gain percentile clumped groups with support did not yield any noteworthy associations.

Finally, since high gainers appeared related to high support systems all children who displayed greater than or equal to 95% of overall three year percent gains in either weight, length, weight/length, or skinfolds' sum frequency distributions were pulled and their three year averages of network size, average contact days, and NSSQ ratings were examined. Table 19 on page 127 presents the frequency percentile marks where each ID placed within that support factor's distribution. For network size

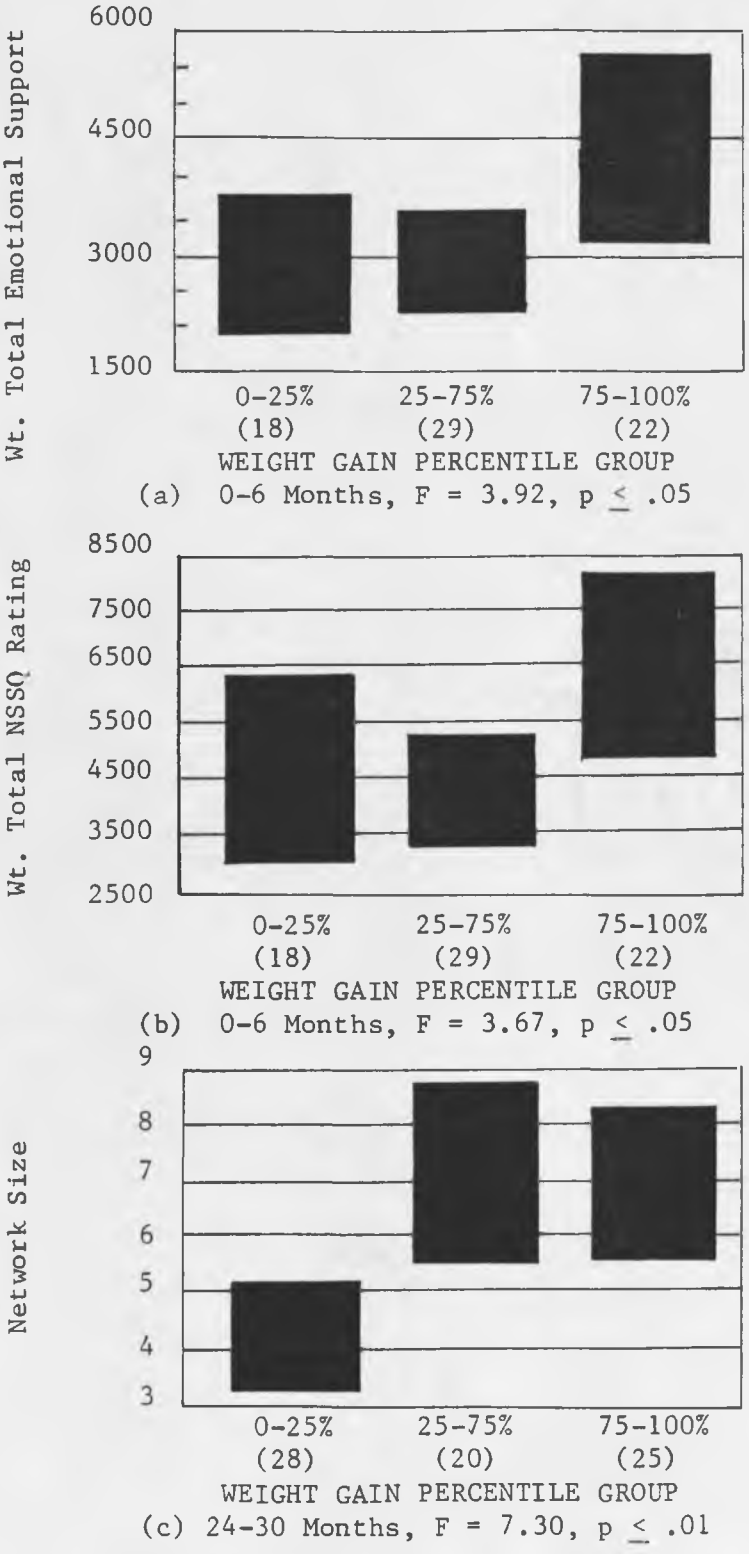
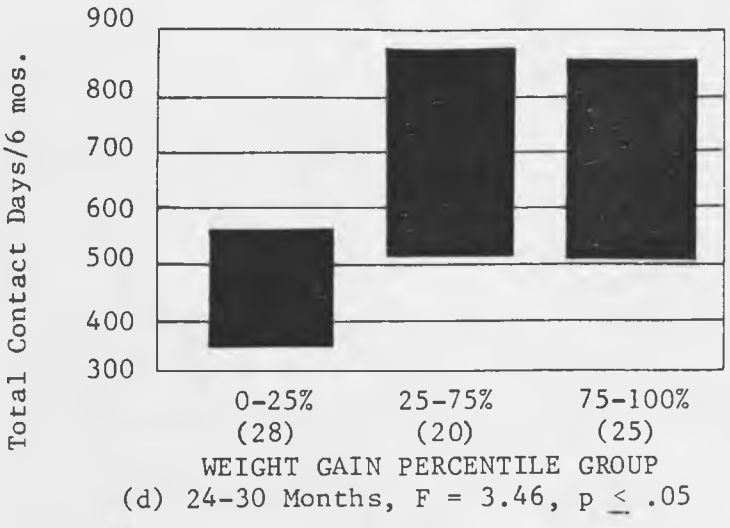
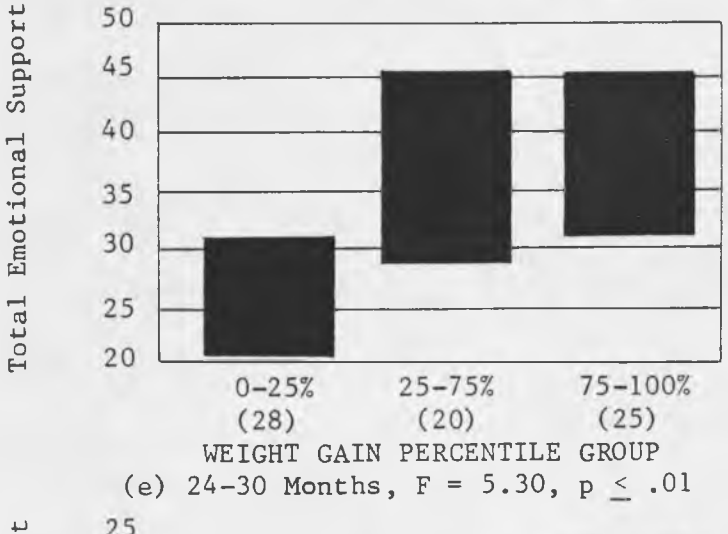


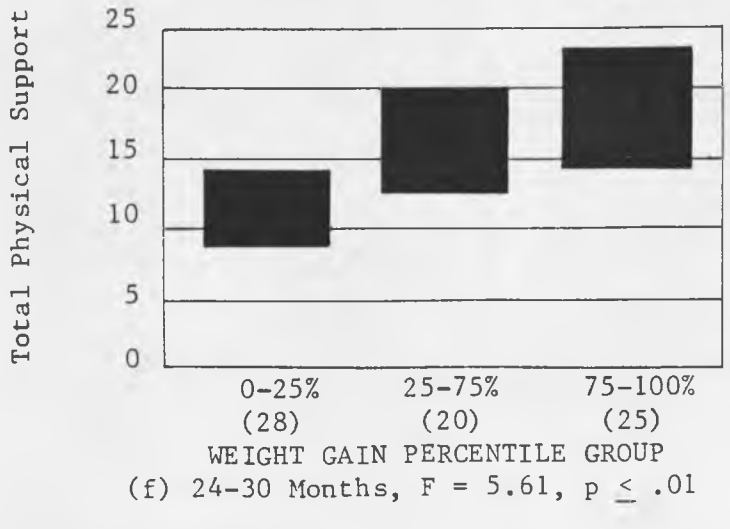

Figure 12. Confidence Intervals of Weight Gain Percentile Groups by Support Variables




(d) 24-30 Months, $F = 3.46$, $p \leq .05$

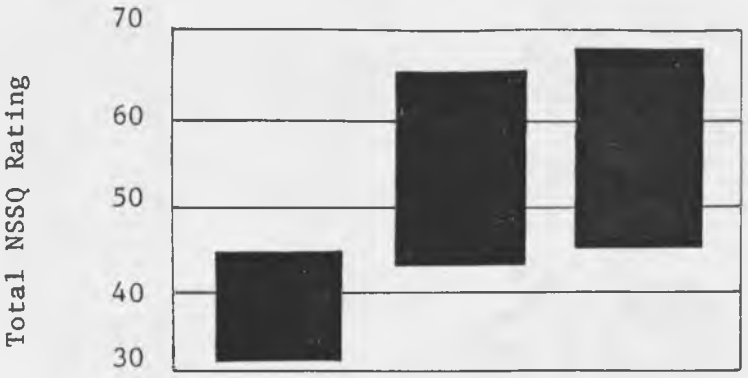



(e) 24-30 Months, $F = 5.30$, $p \leq .01$

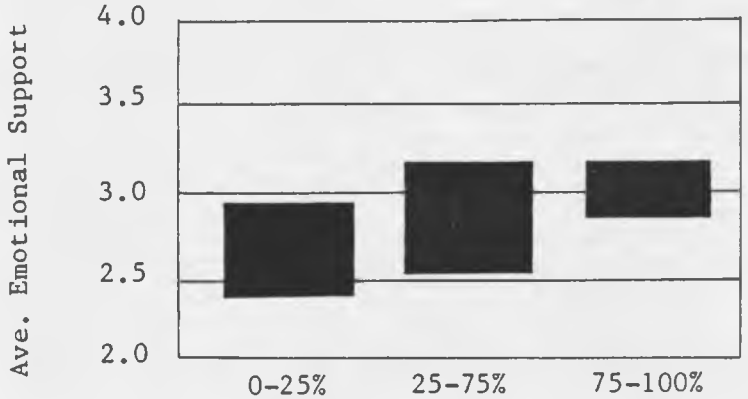



(f) 24-30 Months, $F = 5.61$, $p \leq .01$

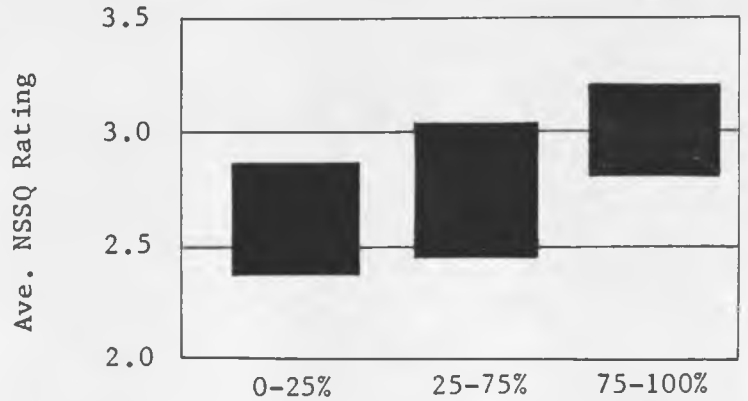
Figure 12--Continued




(g) 24-30 Months, $F = 5.92$, $p \leq .01$




(h) 30-36 Months, $F = 3.20$, $p \leq .05$




(i) 30-36 Months, $F = 4.15$, $p \leq .05$

Figure 12--Continued

Table 19.

Support Characteristics of Fastest Growing Children with 3-Year Growth Changes Over the 95th %iles in Frequency Distributions of Percent Gains in Weight, Length, Weight/Length or Skinfolds

| ID | Network Size | Network Size Freq. %ile | Average Contact | Contact Freq. %ile | NSSQ Ave. | NSSQ Freq. %ile |
|---|---|---|---|---|---|---|
| 110 | 5.0 | ( 55) | 71.6 | ( 26) | 2.4 | (25) |
| 496 | 17.0 | (100) | 64.9 | ( 17) | 2.2 | (14) |
| 552 | 7.0 | ( 71) | 87.1 | ( 39) | 2.6 | (38) |
| 566 | 4.0 | ( 36) | 61.8 | ( 13) | 3.4 | (90) |
| 926 | 12.3 | ( 98) | 93.1 | ( 43) | 3.1 | (70) |
| 937 | 4.0 | ( 36) | 97.5 | ( 46) | 3.6 | (92) |
| 983 | 9.2 | ( 90) | 128.0 | ( 68) | 2.9 | (58) |
| 1016 | 2.0 | ( 11) | 182.0 | (100) | 3.8 | (96) |
| 1041 | 9.0 | ( 89) | 171.9 | ( 88) | 3.2 | (76) |
| 1092 | 7.0 | ( 71) | 135.6 | ( 76) | 3.1 | (74) |
| 1326 | 8.0 | ( 83) | 65.2 | ( 19) | 3.2 | (75) |
| 1328 | 10.2 | ( 93) | 46.6 | ( 7) | 2.9 | (57) |

values, nine of the twelve cases or 75% have network sizes greater than the mean for all 84 children. Eight out of twelve mothers or 67% had less contact frequency than the population mean. Thirdly, 75% of reported NSSQ ratings, the qualitative measure of the support systems, were greater than the overall mean. Network size and NSSQ ratings, although not statistically analyzed in this table, appear to show a fairly strong positive association with growth velocity.

**Growth Versus Life Events**

Tables 20 and 21, on pages 129 and 130 to 132, respectively, are duplicates of Tables 17 and 18 except life event factors are substituted for the support variables. The summary table again displays more positive than negative correlations. However, all of the 30 to 36 month correlations are negative in the expanded Table 21. Just as with the support variables a paucity of significant associations is evident for the 12 to 24 month periods followed by a surge of positive correlations at 24 to 30 months. New sibling and no new sibling cohort differences are evident only at the 6 to 12, 18 to 24, and 24 to 30 month periods. In the first two of these three intervals the new sibling cohort dominates the field of significant growth associations. In the 24 to 30 month period the no new sibling group has more significant correlations than the new siblings group just as was seen in the growth-support correlations of Table 18.

**Table 20.**

Significant Correlations of Life Events Variables Per Six-Month Interval vs. Weight/Length and Skinfolds Sum Change Z-Scores Per Six-Month Interval in All Children, and Children With or Without New Siblings From 12-30 Months*

| Six-Month Interval | 0-6 | | | | | | 6-12 | | | | | | 12-18 | | | | | | 18-24 | | | | | | 24-30 | | | | | | 30-36 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | All | | Sibs | | No Sibs | | All | | Sibs | | No Sibs | | All | | Sibs | | No Sibs | | All | | Sibs | | No Sibs | | All | | Sibs | | No Sibs | | All | | Sibs | | No Sibs | |
| By Prevalence. . . | W/L | S | W/L | S | W/L | S | W/L | S | W/L | S | W/L | S | W/L | S | W/L | S | W/L | S | W/L | S | W/L | S | W/L | S | W/L | S | W/L | S | W/L | S | W/L | S | W/L | S | W/L | S |
| Total Life Events | | | | | | | | | ++ | | | | | | | | | | | | | + | | | | | | | | | | | | | | |
| Negative Life Events | | | | | | | | | + | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Large Life Events | | | | | | | | | + | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Large, Negative Life Events | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Percent Negative Life Events | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | - | | | | | |
| Percent Large Life Events | | | | | | | | | | | | | | | | | | | | | | | | | | | | + | | | | - | | | | |
| Percent Large Negative Life Events | | | | | | | | | | - | - | | | | | | | | | | | | | | | | | | | | | | | | | |
| By Incidence. . . | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Total Life Events | | | | | | | + | | ++ | | | | | | | | | | | | | + | | | | + | | | | | | | | | | |
| Negative Life Events | | | | | | | + | | + | | | | | | | | | | | | | | | | | + | | | | + | | | | | | |
| Large Life Events | | - | | | | | + | | + | | | | | | | | | | | | | | | | | + | | | | | | - | | | | - |
| Large Negative Life Events | | | | | | | | | | | | | | | | | | | | | | | | | | + | | | | + | | | | | | |
| Percent Negative Life Events | | | | | | | | | | | | | | + | | | | | | | | | | | | | | | | | | | | | | |
| Percent Large Life Events | | | | | | | | | | | | | | | | | | | | | | - | | | | + | | | | + | - | | | | | |
| Percent Large Negative Life Events | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | + | | | | | | |
| N | 69 | 67 | 19 | 19 | 50 | 48 | 67 | 65 | 18 | 18 | 49 | 47 | 74 | 81 | 18 | 22 | 56 | 59 | 72 | 80 | 18 | 22 | 54 | 58 | 68 | 67 | 20 | 21 | 48 | 46 | 70 | 65 | 20 | 21 | 50 | 44 |

+ $p \leq .05$ positive correlation
++ $p \leq .01$ positive correlation
- $p \leq .05$ negative correlation

*W/L = Weight/Length
S = Skinfolds Sum

**Table21**

Correlation Coefficients of Growth Changes Per Six-Month Interval in All Children, Children With or Without New Siblings 12-30 Months vs. Life Events Per Six Months

| | 0-6 Months | | | | | | | | | | | | 6-12 Months | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | All Children | | | | New Siblings | | | | No New Sibling | | | | All Children | | | | New Siblings | | | | No New Sibling | | | |
| By Prevalence. . . | W/L % | W/L Z | SF % | SF Z | W/L % | W/L Z | SF % | SF Z | W/L % | W/L Z | SF % | SF Z | W/L % | W/L Z | SF % | SF Z | W/L % | W/L Z | SF % | SF Z | W/L % | W/L Z | SF % | SF Z |
| Total Life Events | | | | | | | | | | | | | | | | | ** .58 | ** .62 | | | | | | |
| Negative Events | | | | | | | | | | | | | | | | | * .49 | * .53 | | | | | | |
| Large Events | | | | * -.26 | | | | | | | | | | | | | * .49 | * .53 | | | | | | |
| Large Negative Events | | | | | | | | | | | | | | | | | | | | | | | | |
| Percent Negative Events | | | | | | | | | | | | | | | | | | | | | | | | |
| Percent Large Events | | | | | | | | | | | | | | | | | | | | | | | | |
| Percent Large Negative Events | | | | | | | | | | | | | | | | | (-.09) | (.13) | -.60 | -.54 | -.28 | -.29 | | |
| By Incidence. . . | | | | | | | | | | | | | | | | | | | | | | | | |
| Total Life Events | | | | | | | | | | | | | * .28 | * .31 | | | ** .60 | ** .64 | | | | | | |
| Negative Events | | | | | | | | | | | | | * .25 | * .30 | | | * .47 | * .51 | | | | | | |
| Large Events | | | | * -.24 | | | | | | | | | * .25 | * .27 | | | * .53 | * .55 | | | | | | |
| Large Negative Events | | | | | | | | | | | | | | | | | | | | | | | | |
| Percent Negative Events | | | | | | | | | | | | | | | | | | | | * .44 | | | | |
| Percent Large Events | | | | | | | | | | | | | | | | | | | | | | | | |
| Percent Large Negative Events | | | | | | | | | | | | | | | | | | | | | | | | |
| N | 69 | 69 | 67 | 67 | 19 | 19 | 19 | 19 | 50 | 50 | 48 | 48 | 67 | 67 | 65 | 65 | 18 | 18 | 18 | 18 | 49 | 49 | 47 | 47 |

*p = .05 **p = .01
W/L = Weight/Length
SF = Skinfolds Sum

Table 21--Continued

Correlation Coefficients of Growth Changes Per Six-Month Interval in All Children, Children With or Without New Siblings 12-30 Months vs. Life Events Per Six Months

| | 12-18 Months | | | | | | | | | | | | 18-24 Months | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | All Children | | | | New Siblings | | | | No New Sibling | | | | All Children | | | | New Siblings | | | | No New Sibling | | | |
| By Prevalence. . . | W/L % | W/L Z | SF % | SF Z | W/L % | W/L Z | SF % | SF Z | W/L % | W/L Z | SF % | SF Z | W/L % | W/L Z | SF % | SF Z | W/L % | W/L Z | SF % | SF Z | W/L % | W/L Z | SF % | SF Z |
| Total Life Events | | | | | | | | | | | | | | | | | | | * .46 | * .45 | | | | |
| Negative Events | | | | | | | | | | | | | | | | | | | | | | | | |
| Large Events | | | | | | | | | | | | | | | | | | | | | | | | |
| Large Negative Events | | | | | | | | | | | | | | | | | | | | | | | | |
| Percent Negative Events | | | | | | | | | | | | | | | | | | | | | | | | |
| Percent Large Events | | | | | | | | | | | | | | | | | | | * -.45 | | | | | |
| Percent Large Negative Events | | | | | | | | | | | | | | | | | | | | | | | | |
| By Incidence. . . | | | | | | | | | | | | | | | | | | | | | | | | |
| Total Life Events | | | | | | | | | | | | | | | | | | | ** .58 | ** .55 | | | | |
| Negative Events | | | | | | | | | | | | | | | | | | | | | | | | |
| Large Events | | | | | | | | | | | | | | | | | | | | | | | | |
| Large Negative Events | | | | | | | | | | | | | | | | | | | | | | | | |
| Percent Negative Events | | | | | | | | * .44 | | | | | | | | | | | | | | | | |
| Percent Large Events | | | | | | | | | | | | | | | | | | | * -.49 | * -.43 | | | | |
| Percent Large Negative Events | | | | | | | | | | | | | | | | | | | * -.43 | | | | | |
| N | 74 | 74 | 81 | 81 | 18 | 18 | 22 | 22 | 56 | 56 | 59 | 59 | 72 | 72 | 80 | 80 | 18 | 18 | 22 | 22 | 54 | 54 | 58 | 58 |

**Table 21--Continued**

Correlation Coefficients of Growth Changes Per Six-Month Interval in All Children, Children With or Without New Siblings 12-30 Months vs. Life Events Per Six Months

| | 24-30 Months | | | | | | | | | | | | 30-36 Months | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | All Children | | | | New Siblings | | | | No New Sibling | | | | All Children | | | | New Siblings | | | | No New Sibling | | | |
| By Prevalence. . . | W/L % | W/L Z | SF % | SF Z | W/L % | W/L Z | SF % | SF Z | W/L % | W/L Z | SF % | SF Z | W/L % | W/L Z | SF % | SF Z | W/L % | W/L Z | SF % | SF Z | W/L % | W/L Z | SF % | SF Z |
| Total Life Events | | | | | | | | | | | * .30 | * .29 | | | | | | | | | | | | |
| Negative Events | | | | | | | | | | | | | | | | | | | | | | | * | |
| Large Events | | | | | | | | | | | | | | | | | | | | | | | | |
| Large Negative Events | | | | | | | | | | | | | * -.24 | | | | | | | | | | | |
| Percent Negative Events | | | | | | | | | | | | | | | | | | | * -.44 | | | | * | |
| Percent Large Events | | | | | | | (-.34) | (-.33) | | | * .30 | * .29 | | | | | | | | | | | | |
| Percent Large Negative Events | | | | | | | | | | | | | | | | | | | | | | | | |
| By Incidence. . . | | | | | | | | | | | | | | | | | | | | | | | | |
| Total Life Events | | | * .26 | * .26 | | | | | | | | | | | | | | | | | | | | |
| Negative Events | | | | * .26 | | | (.13) | (.12) | | | * .30 | * .33 | | | * -.27 | * -.25 | | | (-.08) | (-.02) | | | * -.33 | * -.32 |
| Large Events | | | * .26 | * .25 | | | (.12) | | | | * .29 | | | | | | | * | | | | | | |
| Large Negative Events | | | * .25 | * .26 | | | (.15) | (.12) | | | * .30 | * .32 | | | | | | | | | | | | |
| Percent Negative Events | | | | | | | | | | | | | * -.24 | | | | | | | | | | | |
| Percent Large Events | | | * .26 | * .26 | | | (.19) | (.18) | | | * .29 | * .29 | | | | | | | | | | | | |
| Percent Large Negative Events | | | | | | | | (.09) | | | | * .30 | | | | | | | | | | | | |
| N | 68 | 68 | 67 | 67 | 20 | 20 | 21 | 21 | 18 | 48 | 46 | 46 | 70 | 70 | 65 | 65 | 20 | 20 | 21 | 21 | 50 | 50 | 44 | 44 |

Figure 13 starts on page134 and graphs those significantly different confidence intervals of specific life event factors by weight gain percentile clumped groups. Strongest associations appear at the 6 to 12 and 30 to 36 month intervals. Figures (a), (b), and (c) show that from 6 to 12 months the low gainers have fewer total life events than the medium and high gainers. Later from 24 to 30 and 30 to 36 months the high gainers have fewer total, negative, large, and large negative life events than the middle gainers with the low gainers' mean and confidence interval intermediate, see figures (d) through (i). F-ratios of height gain percentile clumped groups and life events revealed no significant associations.

The final six-month interval correlations generated for child growth velocity were those of growth versus mother's weight/height gain, excluding pregnancies, and household size and number of adults in the household per time interval. None of these correlation runs produced significant associations except for one between mother's weight/height gain and child's skinfolds sum percent change at 0 to 6 months, $r=.33$, $p \leq .01$.

**Three and Two-and-one-half Year Growth Summaries Versus Family Factors**

For both 0 to 36 and 6 to 36 month percent gains in weight, length, weight/length and skinfolds sum, no relationships were revealed in their correlations with the five BSQ scales'

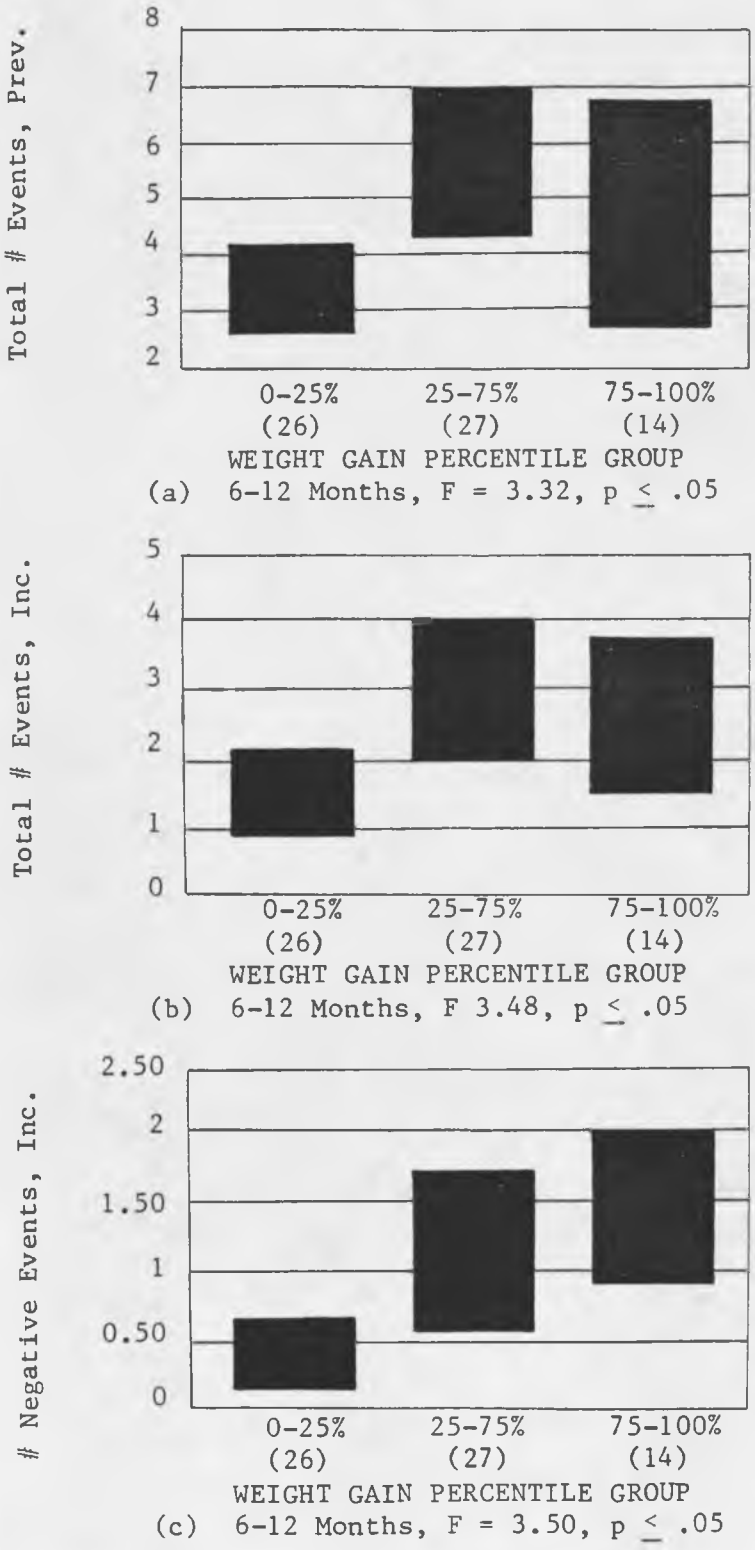
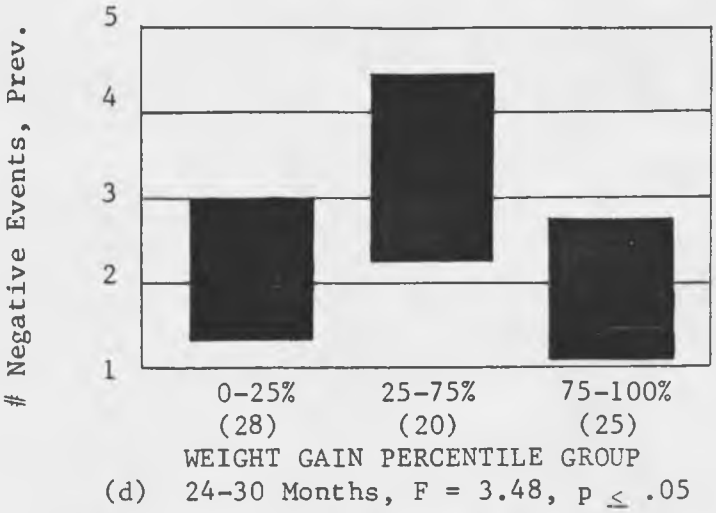
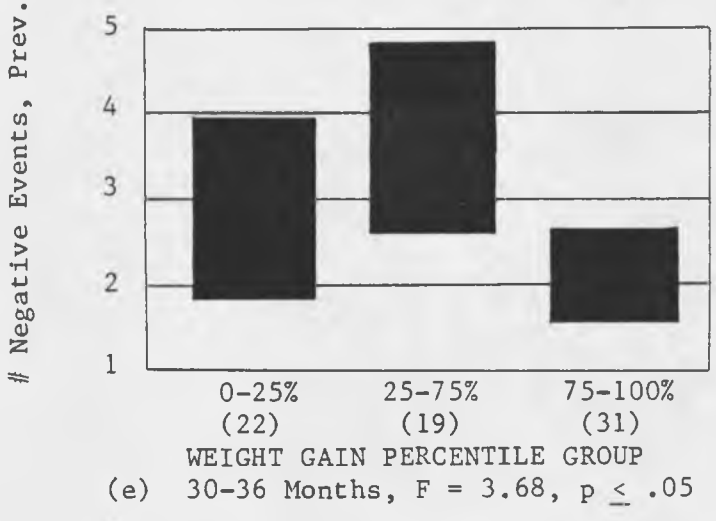


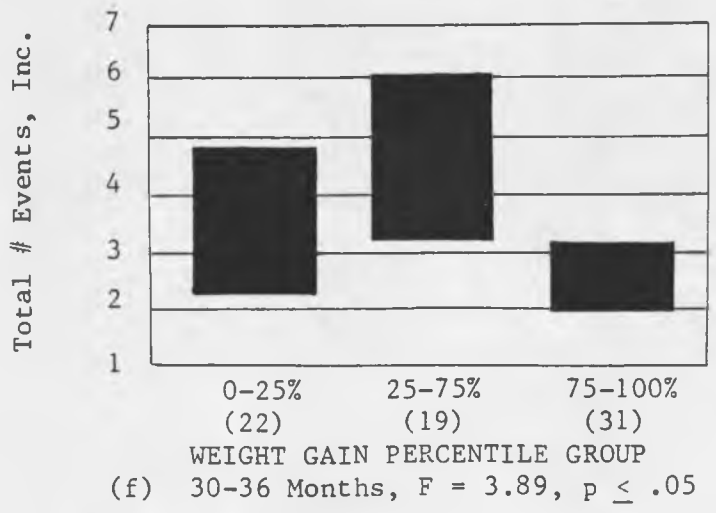

Figure 13. Confidence Intervals of Weight Gain Percentile Groups by Life Events




(d) 24-30 Months, $F = 3.48$, $p \leq .05$

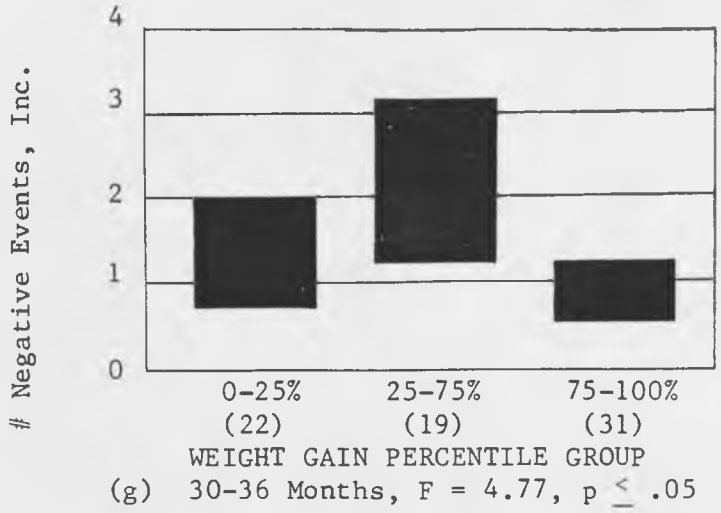



(e) 30-36 Months, $F = 3.68$, $p \leq .05$

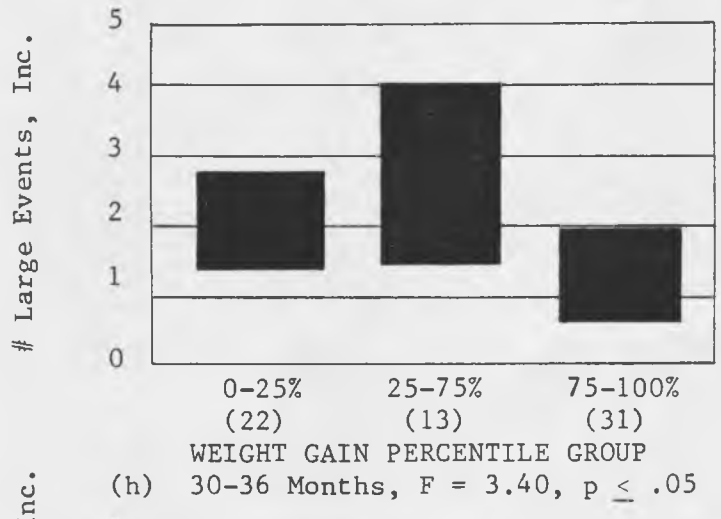



(f) 30-36 Months, $F = 3.89$, $p \leq .05$

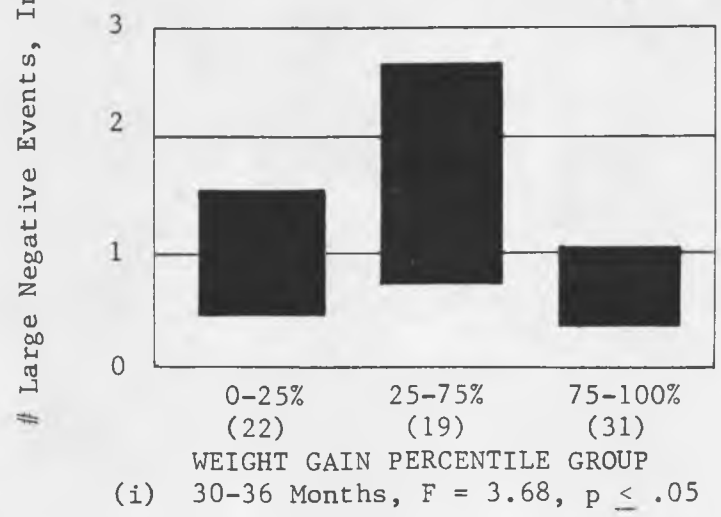
Figure 13--Continued




(g) 30-36 Months, $F = 4.77$, $p \leq .05$




(h) 30-36 Months, $F = 3.40$, $p \leq .05$




(i) 30-36 Months, $F = 3.68$, $p \leq .05$

Figure 13--Continued

average or total and family satisfactions. F-ratios of only three year growth versus behavioral style or total number of weight or length extreme or aberrant periods and five BSQ scales' average displayed nothing of significance. A Pearson correlation was run a second time on the three year percent gains versus the average of five BSQ scores. This time children were separated by the presence or absense of significant temperament change to somehow account for the fact that the BSQ scales were of present and not previous temperaments. This crude attempt to assess past temperament failed to demonstrate any significant associations.

Table 22, page 138, shows the significant correlation coefficients of three year growth changes and support factors for all children and those with or without new siblings. Overall growth of body mass and fatness in children with no new siblings appears more easily influenced by support network size, contact and quality factors in comparison to the growth of children with new siblings. Growth of children with new siblings or no new siblings correlated to overall life events yeilds no associations. In contrast to the results in Table 22, the correlation of two-and-one-half year growth summaries in percent gain of weight, length, weight/length and skinfolds sum with temperament, satisfaction, life events, and especially support factors reveals no significant associations.

**Table 22.**

Correlation Coefficients of Total Growth Changes (0-36 mos.) in All Children and Children With or Without New Siblings From 12-30 Months vs. Three-Year Summaries of Support Factors

| Support Factors | All Children | | | | New Siblings | | | | No New Siblings | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Wt | Lt | Wt/Lt | SSF | Wt | Lt | Wt/Lt | SSF | Wt | Lt | Wt/Lt | SSF |
| Network Size | * .27 | *** .42 | | | (-.15) | (-.06) | | | * .34 | *** .52 | | |
| Average Contact Days/6 mos. | | * -.25 | | | | | | | | | | |
| Total Contact Days/6 mos. | | | | | (-.19) | (-.37) | | | * .30 | * .30 | | |
| Average Emotional Support | * .29 | | ** .33 | | (.12) | | (.11) | | * .34 | | ** .39 | |
| Wt. Ave. Emotional Support | | | | | | | | (-.17) | | | | * .32 |
| Average Physical Support | | | | | | | | | | | | |
| Wt. Ave. Physical Support | | | | | | | | (-.09) | | | | * .33 |
| Average NSSQ Rating | ** .31 | | ** .34 | * .25 | (.27) | | (.27) | (-.04) | * .34 | | ** .36 | * .36 |
| Wt. Ave. NSSQ Rating | | | | | | | | (-.14) | | | | * .33 |
| N | 72 | 71 | 70 | 60 | 21 | 21 | 20 | 20 | 51 | 50 | 50 | 40 |

*p ≤ .05 **p ≤ .01 ***p ≤ .001

F-ratios of total number of extreme or aberrant weight or height gain percentiles against support or life event summaries produce no significant results. Another correlation that completely failed to yeild significant correlations was that of the 36 month attained growth Z-scores in weight, length, weight/length and skinfolds sum with support and life event summaries.

**Multiple Regression**

Multiple correlations by six-month intervals of weight/length or skinfolds sum percent gains or change Z-scores with selected family variable revealed no significant findings. The family variables included the average of the five BSQ scales, total satisfaction, network size, average contact days, average NSSQ rating, percent negative events, and percent large events. Table 23 on page 140 displays the very significant multiple and partial correlation coefficients for three year percent gains in weight, length, and weight/length but not including skinfolds sum. Family variables were not added in a stepwise fashion into the regression equation. The only significant variables on growth were the support size, frequency and quality values. All support variables except average contact days had positive partial correlations. The average NSSQ rating had the largest B in each growth run and therefore the greatest weight in the total equation of all factors. However, network size in length percent gain had a higher partial correlation that the NSSQ rating did. In contrast

Table 23.

Multiple and Partial Correlation Coefficients of Three-Year Summary Growth Changes vs. Selected Family Variables

| Growth Variable (N) | F-Ratio | Multiple R | Significant Variables* | Partial Correlation | B |
|---|---|---|---|---|---|
| % Wt. Gain (72) | 3.32** | .52 | Network Size | .38 | 8.60 |
| | | | Average NSSQ Rating | .39 | 51.74 |
| % Lt. Gain (71) | 3.37** | .52 | Ave. Contact Days | -.23 | -0.04 |
| | | | Network Size | .42 | 1.04 |
| | | | Average NSSQ Rating | .22 | 3.05 |
| % Wt/Lt Gain (70) | 2.97** | .50 | Network Size | .34 | 3.45 |
| | | | Average NSSQ Rating | .40 | 23.69 |

*B confidence interval significantly different by at least .05 from zero
**$p \leq .01$

to these significant three year data correlations when 6 to 36 month growth percent gains were used in the multiple correlation computations with the same family variables no significant coefficients emerged.

**Mother's Weight/Height Gains Versus Family Factors**

As seen with the child's data, mother's weight/height gains versus temperament and satisfaction scales yield no significant associations. Life event factors also show no relationship to mother's body mass index changes. Only in support measures are any associations seen. Of the fifteen types of support variables correlated with mother's weight/height gains only those which produced a significant association are displayed in Table 24 on page 142. Support quality and frequency of contact are positively correlated with weight/height gain from Ø to 6 months. All later correlations seen at 6 to 12 and 18 to 24 months are negative.

**Table 24.**

Significant Correlation Coefficients of Mothers' Weight/Height Gain Per Six-Months (Excluding Pregnancy Periods) vs. Support Factors

| Support Variables*** | Ø-6 | 6-12 | 12-18 | 18-24 | 24-3Ø | 3Ø-36 |
|---|---|---|---|---|---|---|
| Network Size | | | | * -.31 | | |
| Ave. Contact Days | ** .39 | | | | | |
| Ave. Emotional Support | | | | * -.27 | | |
| Wt. Ave. Emotional Support | * .31 | * -.3Ø | | | | |
| Wt. Ave. Physical Support | * .29 | | | | | |
| Wt. Ave. NSSQ Rating | * .31 | | | | | |
| N | 66 | 56 | 53 | 52 | 58 | 58 |

* $p \leq .Ø5$ ** $p \leq .ØØ1$

***Support Variables which did not show significant association with wt/ht gain were: Total Contact Days, Total Emotional Support, Wt. Total Emotional Support, Total Physical Support, Average Physical Support, Wt. Total Physical Support, Average NSSQ Rating, Total NSSQ Rating, Wt. Total NSSQ Rating.

# DISCUSSION

Each of the three family variables--child temperament, maternal support, and stressful life events--in this project's model of growth influences were examined separately and jointly for their strengths in the theoretical equation. As will be discussed in further detail temperament had little if any influence on growth velocity, support measures were associated with growth, and stressful life events played a scattered and small part overall in relationship to growth.

The following discussion will address several areas of the collected data: demographic data, temperament, social support and life event influences on growth, mothers' weight/length gain, the use of velocity data and incremental charts, and the clinical significance of monitoring family environments. Suggestions for future research also will be discussed.

## Demographics

Although the families were not randomly selected from the longitudinal population they still exhibited many characteristics of a heterogeneous sample. Basic demographic characteristics such as education, mother's age at child's birth, working history, household size, and apparent income level from

observation of the home environment all varied considerably. In addition to demographic variety all questionnaire responses were distributed continuously over a wide spectrum.

## Temperament and Growth

Since no agreement has been reached in the literature as to whether stability or variability occurs within a personality style as a youngster matures, the child's present temperament status and a crude estimate of any change occurring in past behavior were used to cover both viewpoints on temperament development.

If stability is present in basic temperament styles then the use of present temperament assessments may be applied to represent earlier ages with some degree of confidence. If variability is inherent with the passage of time then present temperament scales misrepresent past behaviors and must be corrected by some general measure of change. In this study present temperament did not predict any part of past growth patterns. The general conclusions on past behavior change did not assist in clarifying any temperament-growth relationship. The analysis of variance procedures on behavioral style and growth revealed no consistent pattern. This cohort of children could have been a group in phase with its catch up and fallback growth spurts and therefore the correlations may not be particularly meaningful for a relationship between growth and temperament. However, no significant associations between temperaments and increased growth

rates surfaced till after the first year, perhaps indicating that as the child matures to a stage of increased interaction with its environment personality characteristics may influence feeding or activity situations.

## Social Support and Growth

Social support factors assessed through the Norbeck Social Support Questionnaire were associated with several demographic variables including education, work history and ethnicity. The characteristic mother who received high levels of support would be a Mexican American woman with a high school degree who had a long work history or was a full-time homemaker.

Social support NSSQ factors showed the greatest association with growth above all other family variables in both the six-month intervals, seen in Tables 17, 18, and Figure 2 on pages 118, 119 , and 96 respectively, and three year summaries, Tables 22 and 23 on pages 138 and 140. Especially in the multiple correlations of Table 23 it is evident that support outweighs all other family factors in its power of explanation of change in growth rates. Both quantitative as well as qualitative aspects of support were associated with the direction and speed of growth since all three pure support factors, size, frequency and quality, showed significant correlations in bivariate as well as multiple regressions.

Several patterns of support factors in relation to growth velocity become apparent in Table 19 and Figure 12, pages 127 and 124 respectively. The positive correlations seen in Tables 17 and 18 prompted the calculations for Table 19 in that high support ratings were associated with high growth rates. Trends are evident of larger network size and greater qualitative support by members towards faster growth rates, as seen in both the table and figure. Statistically Figure 12 also shows that greater average contact frequency is associated with high growth. These trends indicate that perhaps greater social support translates into more people and their attitudes being available at feeding situations. These support members may encourage greater food consumption by the child or somehow influence the feeding situation. Figure 12 shows this support-growth trend pictorally with the mothers of low weight gainers receiving less contact and support, and smaller network sizes than the medium and high gainers' caretakers.

The significant correlation differences between the new siblings and no new siblings cohorts in Tables 17 and 18 are interesting in that differences show up in the first six-month period even before any new siblings were introduced to those families. Perhaps relationship dynamics or the developmental stage is different in these prospective new sibling families from the other family units. Some type of family processing characteristic of growing families may allow a greater sensitization towards support levels to exist and influence the feeding environment.

The three year summary of growth and support for children with or without new siblings, Table 22, can also support the notion that the family dynamics are somehow different for a child without a new sibling compared to a growing household. Greater social support is associated with increased growth rates and the significant social support variables possess a 10 to 25% predictive capacity on growth change variance.

Use of the APGAR Satisfaction scale to assess family environment on growth revealed only one type of correlation coefficient from 12 to 18 months for weight/length percent gain and change z-scores against total and family satisfaction. With a possible 48 responses over the entire three-year period for weight/length and skinfold percent gains and change z-scores available, only four responses all in the weight/length scores for 18 to 24 months appeared to give no more than a point source of association. This finding may not really contribute meaningfully to an overall view of growth and family environment.

The criticism about different social support questionnaires not equally measuring the same characteristics of the network bears true when viewing the vastly different results in associations of the NSSQ factors and the APGAR satisfaction scales on growth. Social support responses cannot be compared from one population using a specific instrument to another measured by a different scale. Results truely depend upon the measurement tool when concerned with social support.

## Life Events and Growth

Effects by life events are scattered and show little influence below 24 months but more after that age. Around weaning time, beginning at 6 to 12 months in this population, the greater the number of total or specifically stressful events the greater the change observed in weight/length status as shown in Tables 20, and 21 on pages 129, 130 and 131. Figure 13's (page 134) graphing of weight gain percentiles by life events measures tempers the conclusions drawn from the plethora of positive correlation coefficients in the two tables mentioned. Low weight gainers experienced fewer life events than the medium and high gainers when under 12 months of age (graphs (a)-(c)). After 24 months of life the high gainers did not continue that trend of increased events but instead plunged lower than the mean events occurring to the low gainers (graphs (d)-(i)). Perhaps a modicum of events must occur in the toddler's family life from 24 months on in order to help provide enough stimulation for moderate growth. Understimulation by less eventful atmospheres could reflect in more extreme growth rates.

The same pattern of growth in the new sibling and no new sibling cohorts for life events, Table 21, occurs as seen for social support, Tables 18 on pages 119 to 121. At younger ages the new siblings group exhibits greater significant numerical control over the pattern of correlation coefficients seen in all the children combined. Just as with social support this trend

reverses itself at older ages with the no new siblings cohort becoming more sensitive than their counterparts to life events.

Social support and life event influences on growth also contrast with each other. In Table 18 children under 12 months are growth labile through skinfold thickness changes and later show growth sensitivity through weight/length measures. These study children exhibit a reversed trend of growth sensitivity to life events. In Table 21 weight/length is affected at younger ages and skinfolds after 18 months of age.

When overviewing the entire three years of growth-life event correlations in Table 20 one notes that event measures by prevalence do not yield as many significant relationships as when using events by incidence. The attempt in this project to account for the chronicity of stressful events and not just their onset did not produce any finer results than the incidence method currently used. Furthermore, comparing the degree of correlation assessed by the different methods shows that the originally proposed method of total event count results in equal or greater degrees of correlation than the other selective methods. For example, weight/length changes from 6 to 12 months by total life events, either by prevalence or incidence, produces correlations significant at .01 level. Whereas, correlations using the number of negative or large events decreases the significance to less than or equal to .05. Finally, when correlating life events to three-year overall growth or including the factor in multiple

regression analyses it becomes evident that the predictive power of life events is apparently not great enough to produce statistical significance. However, realizing how far back mothers had to recall, it is surprising to find so many significant relationships at all throughout just the six-month periods.

## Mother's Weight/Height Gains

The environmental factor which was significantly related to mother's weight/length was also the most influencial on child's growth rates. Support correlations with mother's body mass changes were all positive for the first six months, see Table 24 on page 142. The few correlations significant after six months postpartum become all negative. The highest correlated support measure with mother's gain was the pure measure of frequency of contact at the .ØØ1 level. Keeping this association in mind a brief turn to two other correlation runs may show a three-way association of factors and growth. The only significant association period for mother's weight/length gain and child's growth rate was at Ø to 6 months for skinfolds sum percent gain and change z-score. In addition it was primarily skinfold variation which was affected by support factors, particularly frequency variables, in children under 12 months of age as seen in Table 17 on page 118. Perhaps a three-way association exists in the highly vulnerable first six-month period between mother's weight/length

gain, child's skinfolds sum changes and support network frequency of contact.

## Use of Velocity Data and Incremental Growth Charts

This study affirmed the claims by growth velocity supporters that measures of growth rate are more sensitive than the use of attained growth measures. Not one family variable correlated with 36 month attained weight, length, weight/length of skinfolds sum measures. Three-year growth percent gains on the other hand were significantly related to support variables through bivariate and multiple regressions as reported in Tables 22 and 23, on pages 138 and 140 respectively.

Incremental growth charts were used in this study for both a standardized means of describing the sample children's growth changes over time and as a parameter to categorically hold children for hypothesis testing purposes in their weight and height fluctuations.

Figures 5, 6, 9, and 10 (pages 102, 104, 109, and 111) exemplify how the growth of a population may be defined. Simple frequency distributions of weight and height gain percentile groups as standardized by Roche and Himes (1980) are plotted out over time as in Figures 5 and 6. These graphs demonstrate why after 6 months assumptions of normally distributed growth rates must be abandoned to perhaps the notion that it is "normal" for young children to vacillate from higher to lower weight gains

(Harrison in press) as previously stated. Figure 9 describes the population according to the frequency of growth periods which displayed weight gains above and below specified percentile limits. Figure 10 displays the wide range of movement from one extreme percentile group to a similar but opposite one in compensatory changes. These two figures again speak out that wide variation in growth rates of a "normal" population is frequent and that individuals across the entire population adjust for these wide swings in their growth velocity.

For hypothesis testing purposes gain percentile groups showed that height did not have any association with the family factors. Weight gain percentile findings were previously discussed in the life events section of this chapter. Three year summations of extreme and aberrant growth periods had no associations with family environment three year summaries. Perhaps the tendency to peak and fall in growth rates is so strong in childhood growth patterns that environmental influences short of extreme hardship and duration do not alter the number of extreme periods.

## Clinical Significance of Monitoring Family Environment

To monitor as completely as possible those variables which affect a child's physical growth, the physician needs to assess life changes and support characteristics of the family. On an individual basis, some children in the study appeared to reflect

family crisis by their weight changes at various times in the three year period, while other children's attained growth and rate of change did not reflect the family environment. Although a substantial proportion of children may not alter their growth in response to stress and support factors, the physician should acknowledge that environmental monitoring is significant and required because of the lability found among some children.

Three cases examples will show how varied the factor mix of growth, support and stress can be. Rate change and attained weight/length measures are most productive when used in tandem. The examples provided below include (1) a family under high stress and low support with a child displaying only one compensatory weight change but an absolute weight decrease, (2) another family experiencing less intense scattered stresses, low support, and a child exhibiting three compensatory weight changes yet maintaining herself near the 50th percentile in absolute weight/length, and (3) one potentially high stress situation with adequate support and only one compensatory weight change with no lasting effect on absolute weight/length.

Figures 14 and 15 on pages 154 and 155 diagram the weight gain percentile (incremental growth) and the attained weight/length percentiles at each measurement period of a male Anglo child. From 18 to 24 months the child dipped substantially in weight/length but started to recover at 30 to 36 months towards his previously attained percentile rank. The incremental chart

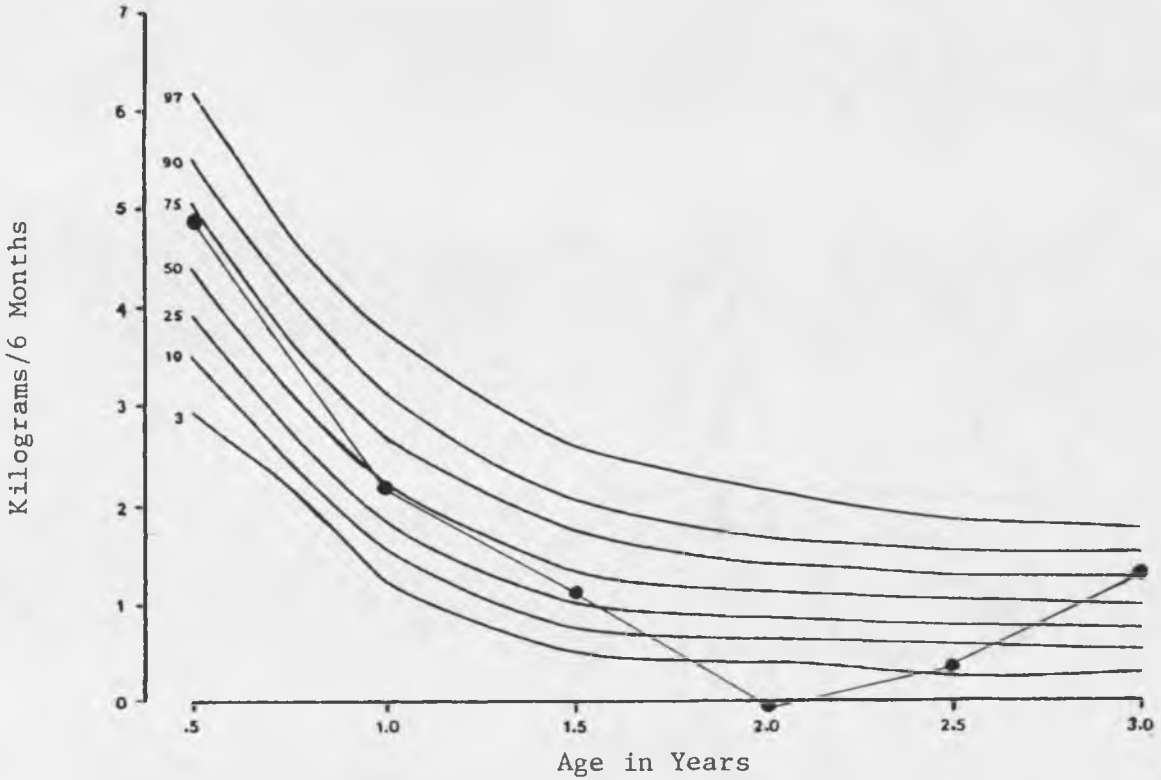



Figure 14. Adjusted Weight Gain Percentiles per Six-Month Periods of Male Study Child #466

*Growth chart taken from Roche and Himes, 1980.

Growth chart taken from Hamill et al, 1979.

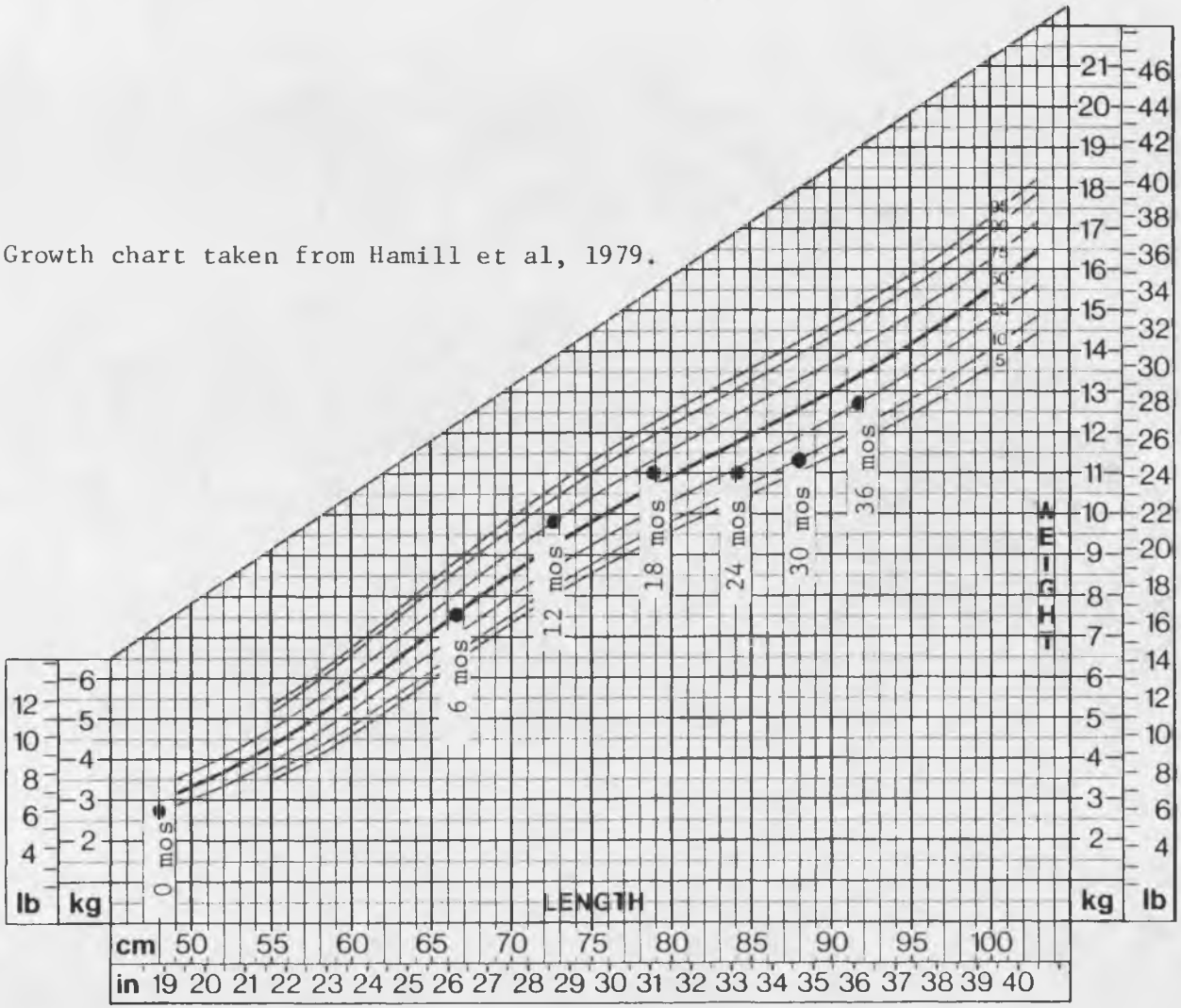



Figure 15. Adjusted Attained Weight/Length Percentiles per Six-Month Periods of Male Study Child #466

shows one compensatory change from 24 to 30 months at the 3-10%ile to the 75-90%ile at 30 to 36 months. Partial explanation is apparent in his illness history. A series of ear infections, chicken pox and fever from 18 to 24 months most likely began his decent in weight. However, recovery did not appear in the following six-month period but was delayed until 30 to 36 months. The mother expressly noted at age 36 months that the child's low weight might be due to "stress". The household was unstable from 18 to 30 months with numerous chronic, intense stresses including (1) the mother beginning work, (2) a sibling born, (3) the family moving in and out of grandparents, (4) father leaving home and divorce, and (5) mother beginning dating. The mother rated her total satisfaction with her support system at the sixth percentile compared to the other 82 mothers in the study. Although the NSSQ variables showed daily contact with parents and good reliability of their support, the number of her total contact persons was relatively small (36%ile). Therefore, little emotional release was available. Although illness may have initiated the child's weight decline, perhaps the difficult family situation perpetuated the lowered growth state for a relatively brief but noticeable period.

The second child's growth is shown in Figures 16 and 17 on pages 157 and 158. Wide swings in weight gain percentiles progressed throughout the female Anglo's early childhood with three compensatory weight changes. When growth is viewed through

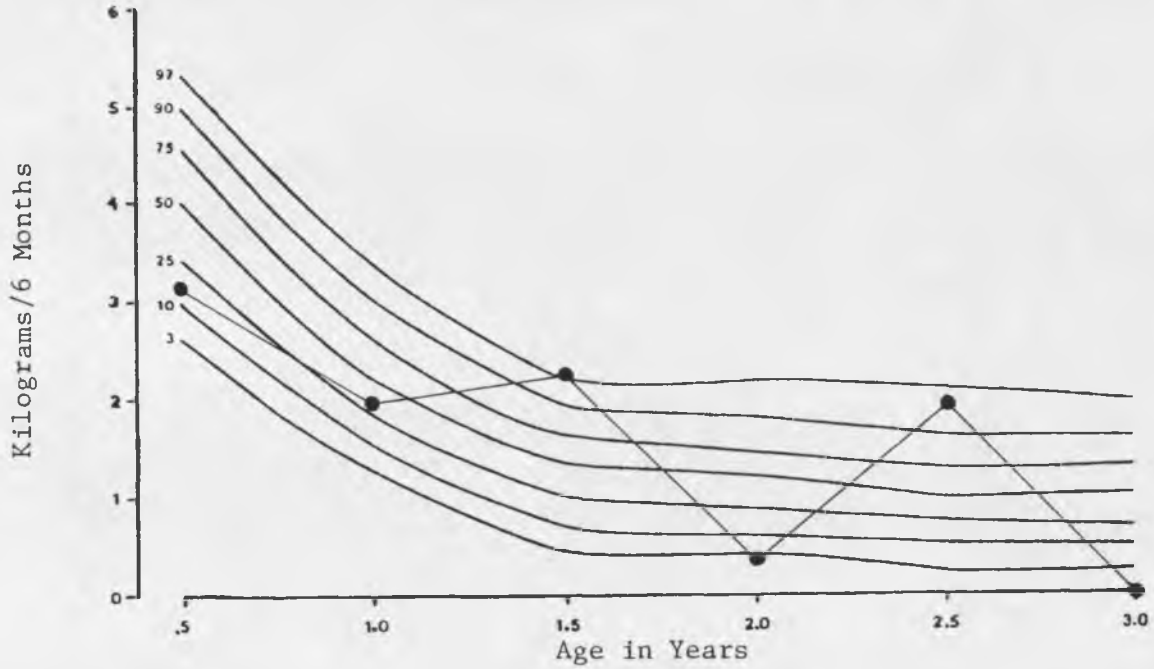



Figure 16. Adjusted Weight Gain Percentiles per Six-Month Periods of Female Study Child #624

*Growth chart taken from Roche and Himes, 1980.

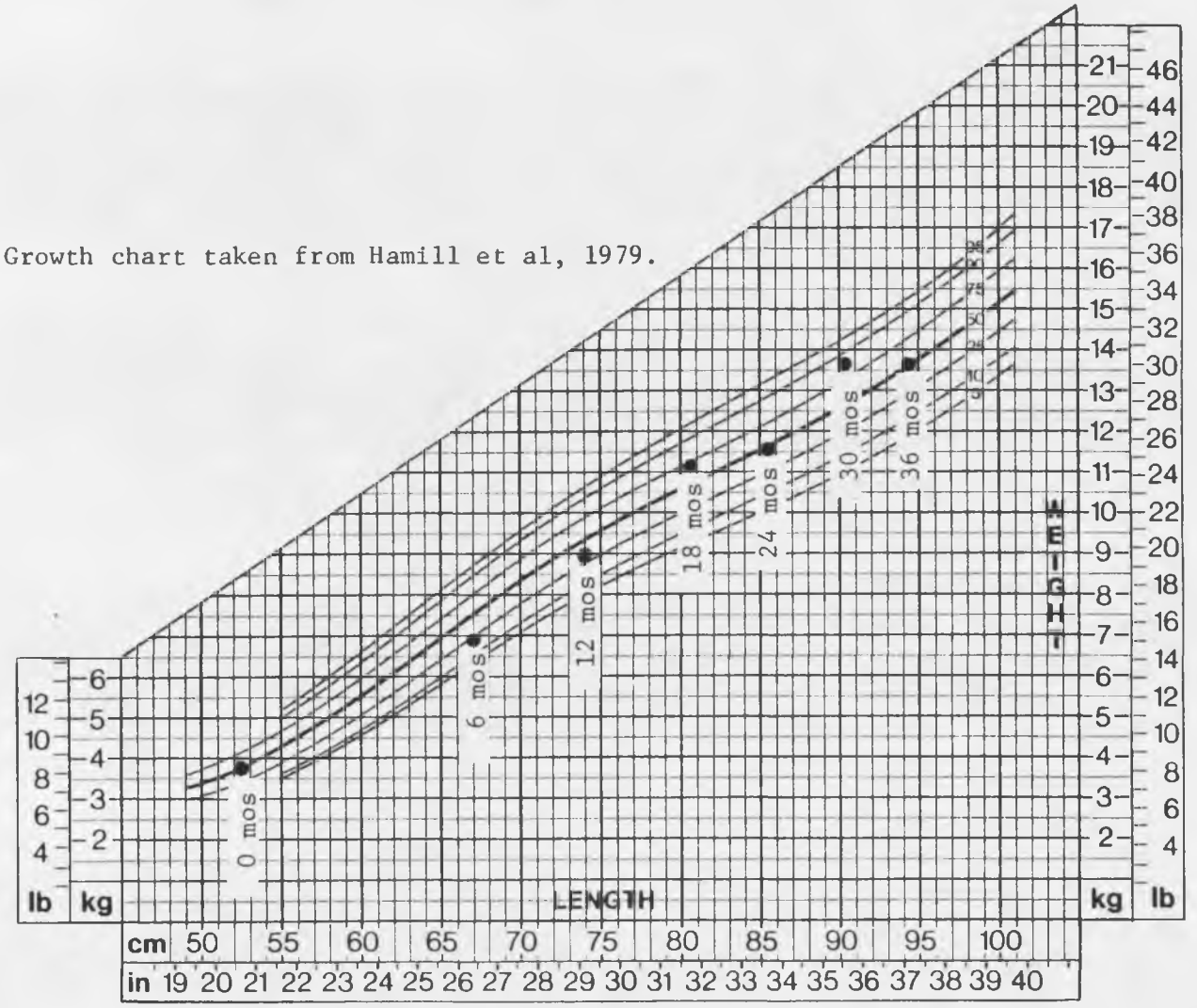



Figure 17. Adjusted Attained Weight/Length Percentiles per Six-Month Periods of Female Study Child #624

attained weight/length the fluctuations all centered around the middle percentiles with no extremes lasting through any period. In this family stresses were less than extreme in nature and scattered throughout the three years. Consistently the father was not working due to a medical disability, the mother remained in school during that time, one child was born, one move occurred, and one substantial disagreement with relatives ensued through those years. The mother rated satisfaction with her husband and all supports greater than the 50th percentile, yet she only placed at the 10th percentile for frequency of contact and at the 4th percentile for reliability of support (NSSQ) from her network. Although the support variables gave inconsistent ratings, basically the mother was very close to her family but distant with relatives and friends. All childhood illnesses were typical and scattered in time of occurrence. Even though the household composition was stable the financial condition of the family shifted each summer to leaner periods when GI benefits were lowered. All the compensatory changes from high to low weight gain occurred in the summers. The mother noted that during those times she had to cut out some foodstuffs and began to raise a garden and poultry. In this case, the child's fluctuations probably did not reflect the emotional state of the family but rather the food availability. The family exhibited coping strategies for this income problem and the child's overall attained growth was not adversely affected.

In contrast to the first family the third household's stressed environment did not result in absolute weight changes for the female Anglo child although the family was subject to various high risk events. Figures 18 and 19, pages 161and 162, show one compensatory weight change on the incremental chart from 75-90%ile to 3-10%ile. However, only steady attained growth elapsed over all periods when viewed by absolute weight/length percentiles. This family was stable in composition and the mother's satisfaction with support members ranked over the 80th percentile. Both size and reliability of support were shown over the 50th percentiles. A high number of potentially stressful events occurred yet only 11 percent of all events recalled were rated negatively. In this situation the mother's religious outlook on life and religious community support affected her attitude of all events befalling the family. Among these occurrences were (1) alcoholic husband breaks back, recovers and returns to work over a year's period, (2) family income drops off and they live from donated gifts, (3) mother has back surgery and later surgery for Chrohn's disease, (4) mother's father dies and her mother moves in briefly, and (5) mother discoveres she has insulin-independent diabetes and monitors her food intake. These events were scattered over the three year period and were not recalled with remorse or despair by the mother.

In summary, these three case studies substantiate the notion that support systems as well as attitudes and coping

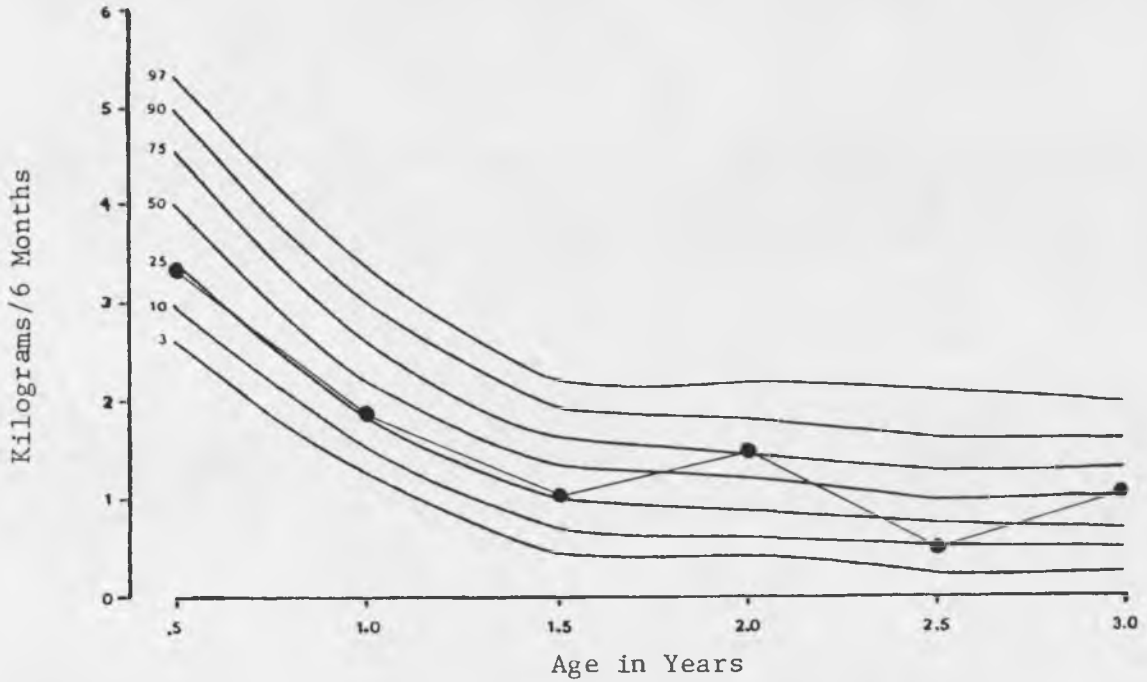



Figure 18. Adjusted Weight Gain Percentiles per Six-Month Periods of Female Study Child #971

*Growth chart taken from Roche and Himes, 1980.

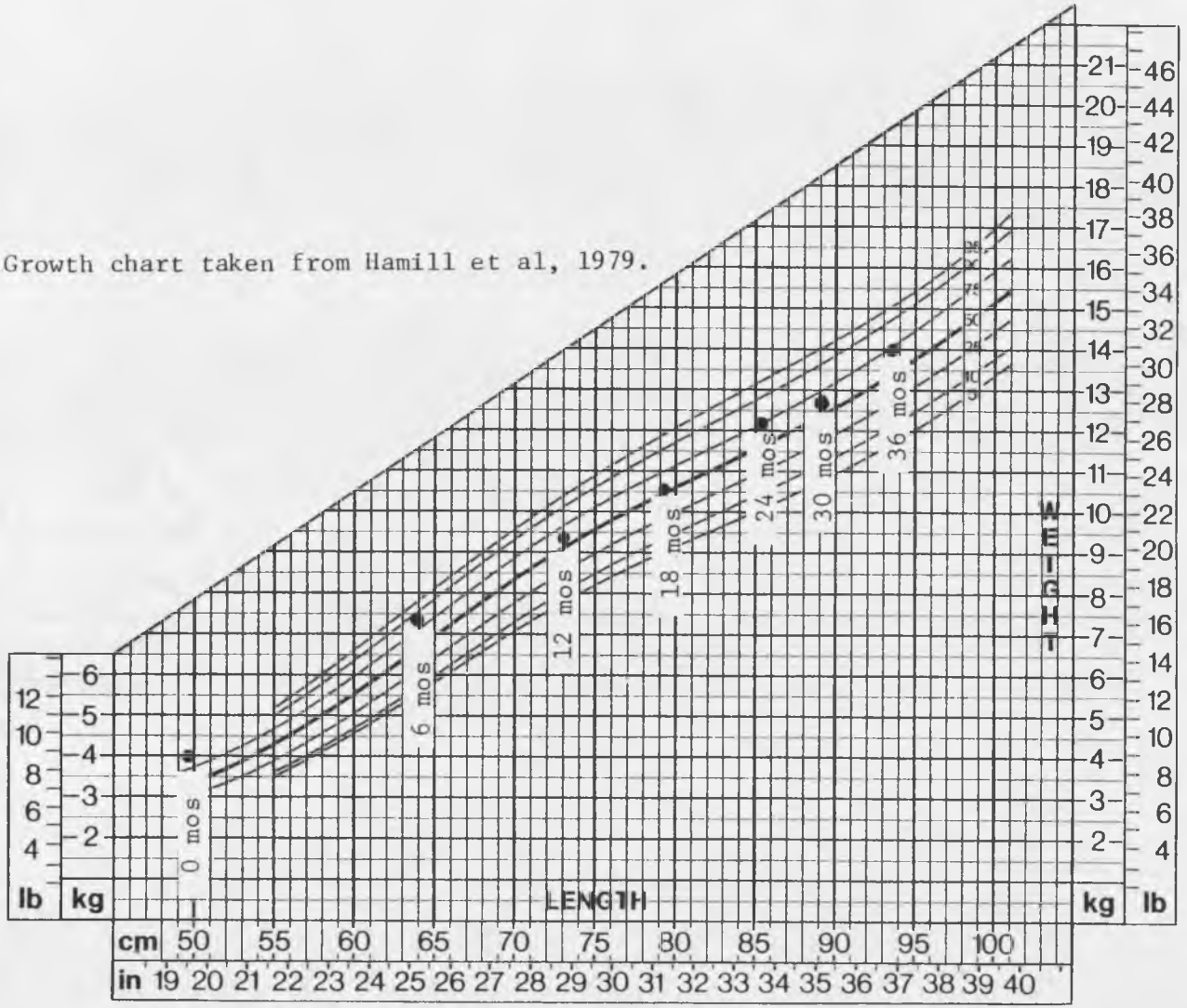



Figure 19. Adjusted Attained Weight/Length Percentiles per Six-Month Periods of Female Study Child #971

behaviors affect the stress level of high risk events. Growth showed no consistent pattern with environment when viewed on a family by family basis. Both sensitivity and resistance to environmental effects on growth were displayed by families in extreme situations. Only a relatively few environmental variables were examined in this study and therefore the inability to explain totally all growth-environment relationships is understandable. However, this brief view of individualized family environment data collection demonstrates the usefulness of the model's theory.

## Future Research Improvements

With the conclusion of any investigation suggestions can be made for improved data clarity in repeated trials or in studies based on variations of the current hypothesis tested. If this study were repeated to further test the strength of those associations revealed between temperament, support and life events on growth, several modifications in the design would be implemented.

First, the study would be composed of prospective and retrospective data collections. Child temperament and support systems would be assessed at the start of a growth period of interest and again defined at the time period's end. Therefore, especially with temperament, these measurements could be assessed for changes with time. Life events would be recorded no further than six months apart. Hopefully event recall would become more complete and accurate in time placement.

Second, each of the three variables would be measured in slightly different ways. Temperament reports of children by parents often are reflections of the parent's perceptions. Therefore, to validate the responses some type of personal observation by the interviewer and assessment of behavior would be added to the protocol. In addition a measure of family functioning (solving problems, relationship dynamics) would help the investigator determine the degree to which a family could cope with stresses. Also, the level of family functioning determines how the parents interact with the type of temperament the child displays.

Social support of the entire family could also be measured in addition to a concentrated view on the main caretaker. Outside sitters who cared for the child for a minimum of a specified frequency would be measured. Environmental stress and social support stability for the sitter and childcare atmosphere would be assessed since some children spend considerable time in environments outside the home at these early ages and are influenced by them.

The standardizing life events interview would be eliminated and incorporated into the life events survey. Therefore, families could directly classify the impact of events as they recalled them since stress is an individual perception. An abbreviated Likert-type scale could allow subjects to rate events as large or small, positive, negative or neutral events.

Finally, some type of periodic monitoring of child activity level, family and child eating habits and their changes could be correlated with the family stress, support, and relationship/temperament factors. Child feeding/activity patterns and their evolution throughout childhood result in a young child's physical state. Feeding and activity styles may act as the link between any relationship of family environment and infant/child growth patterns.

## SUMMARY AND CONCLUSIONS

Eighty-three families were retrospectively interviewed for their support and stress levels during their child's first three years to explore the association among these and two variables, longitudinal growth and attained growth. Longitudinal assessment has been reported to improve analysis outcome for some associations of growth with other variables as compared to cross-sectional evaluation. Statistically, rate changes show significant correlations with family variables in this study while attained weight and height do not reveal any associations. Therefore, this report adds support to the notion regarding longitudinal data.

The overriding conclusion of this project focuses on the wide variation in growth rates seen between and within children who did not reach extremes in attained growth at their endpoint measurements. During any six-month period of the children's three year measurements, less than 50 percent of the subjects were categorized in the 25-75th percentiles of growth velocity. That is, over one-half of all growth increments were below the 25th or above the 75th percentiles. Yet, these children who exhibited extremes in growth rates centered around the United States

national averages at three years of age for attained weight and height. Their growth patterns account for these non-extreme end-points. Approximately 75 percent of all children with complete data exhibited compensatory weight changes over the three year period. When a child slowed or increased his/her speed of growth during one six-month period, this "aberrancy" was compensated by a nearly equal but opposite change of pace. The notion that children canalize in their growth is supported by these data, and therefore observation of short-term wide swings in growth may not be fully predictive of later extremes in attained growth.

In the clinical setting health care providers express concern when growth rates accelerate or decelerate beyond a certain point, yet compensatory growth is usually expected to follow. It is the child who does not compensate that requires therapeutic measures by the clinician. Childhood aberrancies in growth rates are initiated by a variety of environmental conditions. If these conditions are short lived, then the child's natural inclination to compensate corrects the extreme growth velocity. However, the child who does not compensate may be affected by chronic environmental or genetic influences. The early ability to determine whether a child is in a short of long-term growth aberrancy is the key to proper clinical treatment.

Turning now to the family environment factors investigated in this report, both significant and non-significant associations are noted. The first variable assessed, temperament, does not

show any relationship to growth changes. Yet it may still play a small part in overall development outcome. An established association between child temperament and parental response is well known to be interactive. Therefore, the child's measured behavioral style may reflect the mother's stress level or the family's psychosocial environment may shape temperament outcomes. Although no direct relationship was apparent between growth and temperament, this factor may still play an indirect role in family environment.

Among all variables, support factors are most highly associated with growth changes. Increased support, especially in amount and frequency of contact, is related to increased growth rates. Children under 12 months or over 24 months of age appear to be most sensitive to support variables in their weight/length and sum of skinfolds change Z-scores and percent gains, as seen in Table 18 (pages 119 to 121). Statistically significant correlations are noted, ranging from +Ø.24 to +Ø.67. Probably intervening factors mediate the association; for example, the amount of food consumed by the child may increase as support members increase in numbers and contact with the subject family. It is not uncommon for visitors and relatives to encourage above normal food intake via the introduction of special foods as gifts for a child.

Patterns in the distribution of positive correlations between support factors and growth become evident upon visual

inspection of Table 18. Skinfold thickness changes are more sensitive to support factors at earlier ages, under one year, while weight/length changes reflect support levels after two years of age. Dividing children into those who gained a new sibling before age two-and-one-half and those who did not also produce significant differences in support/growth associations. During any six-month period, either group of children might show more sensitivity to support levels than the other group. Any explanation for these patterns is speculative only. The influence of family dynamics or stage of family development is suggested in these findings. Adipose and lean tissues may be more sensitive physiologically to environmental stimuli at some periods of development than at others, and therefore a particular tissue is affected by support levels only at certain times of maturation.

Stress levels measured by life events introduce scattered effects on growth. As discussed earlier with support measures, growth is most sensitive to stress during infancy and older toddler years, but the sensitivity is less than to social support. Fewer correlations were highly significant ($\leq .01$) than in the support-growth regressions (Table 21 on pages 130 to 132). Skinfolds are more sensitive to stress at older ages and weight/length at younger ages. This is the opposite direction from the distribution of coefficients shown for support measures. Results indicate that little change is seen in the absolute value of correlation coefficients whether stress is measured as the total

number of events or by impact. Overall, stress appears to affect growth less than do support levels.

For use in the clinic, an abbreviated form of this interview or similar instrument available would provide the basic information needed to assess a family's environmental status within a time frame acceptable for the clinic setting. An overall impression of social supports and coping resources, stress-inducing conditions and events occurring to the family members, childrearing attitudes and practices, and financial stability seem to be the key elements to a general assessment. Even some monitoring of daily hassles, the complement to major life events as stress inducers, could be valuable; the interview would be less retrospective that the current project's and recall ability would increase. As Fried (1950) stated, growth is not controlled by purely physical forces. Therefore, the clinician must be aware of psycho-social conditions which may impinge upon the speed and direction of growth.

# Appendix A

## FAMILY ENVIRONMENT INTERVIEW

### Letter of Introduction Sent Before Scheduling Interviews

Dear:

Within the last three years you and your child participated in the University of Arizona's infant growth study directed by Dr. Gail Harrison. As one of her graduate students I plan to do a small project connected to the larger growth study for my thesis research. The study looks at the family environment of young children in the first three years of life and its relationship to early development.

Because of your participation in the three-year project, we thought that you might help in this small study. Only one interview approximately two hours in length will be required. Within a few weeks I will contact you with more information about the study and for your response to being interviewed once more. If the mailing address I used is not current or if your phone number is not _____, please call 626-7863 and leave a message for me with the correct information.

Thank you for your interest. Information on your child's early growing years can now benefit two studies about infant development. I hope to be visiting with you soon.

Sincerely,

Sarah Jorgensen

## Statement Given to Mother at Beginning of Interview

The following questionnaire is part of a master's thesis on family environment and child development from birth to the age of three. The questionnaire concerns child temperament, caretaker's support systems (friends, relatives), and major life events occurring in the family when the child was under three. The names of all families that participate in this study will remain anonymous in the written report.

At any time you are free to refuse to answer any questions or to stop the entire interview.

Thank you for your help.

Sarah Jorgensen

Gail G. Harrison, Ph.D., advising professor

# FAMILY ENVIRONMENT AND INFANT GROWTH PATTERNS INTERVIEW

## Background Information

Child's Name: _____ I.D. Code # _____

Sex: _____ Interview Date: MO_____ DAY_____ YR_____

Birthdate: MO_____ DAY_____ YR_____

Name of Parent(s): _____

Address: _____

Phone: _____

Ethnicity: Mother_____ Father_____

Highest grade completed in school: Mother_____

## History of Household Composition

| Time At Birth: | Name | Relationship | Time | Name | Relationship |
|---|---|---|---|---|---|
| | _____ | _____ | _____ | _____ | _____ |
| | _____ | _____ | | _____ | _____ |
| | _____ | _____ | | _____ | _____ |
| | _____ | _____ | | _____ | _____ |
| | _____ | _____ | | _____ | _____ |
| | _____ | _____ | | _____ | _____ |
| | _____ | _____ | | _____ | _____ |
| | _____ | _____ | | _____ | _____ |
| _____ | _____ | _____ | _____ | _____ | _____ |
| | _____ | _____ | | _____ | _____ |
| | _____ | _____ | | _____ | _____ |
| | _____ | _____ | | _____ | _____ |
| | _____ | _____ | | _____ | _____ |
| | _____ | _____ | | _____ | _____ |
| | _____ | _____ | | _____ | _____ |
| | _____ | _____ | | _____ | _____ |

## Behavioral Style Questionnaire

DESCRIPTION:

The Behavioral Style Questionnaire is a 1975 copyrighted instrument developed by S.C. McDevitt and W.B. Carey. It consists of 100 behaviorally-oriented statements in which caretakers are instructed to indicate the response "that tells how often the child's recent and current behavior has been like the behavior described by each item" (McDevitt and Carey instructions). Responses include: almost never, rarely, usually does not, usually does, frequently, and almost always.

SAMPLES:

"The child runs ahead when walking with the parent."

"The child sits calmly while watching TV or listening to music."

"Changes in plans bother the child."

CODING:

Each statement is categorized into one of nine profiles comprising temperament as defined by Thomas, Chess and Birch research (1968): activity, rhythmicity, approachability, intensity, mood, persistence, distractability, and threshold of attention. The six responses available to each statement are assigned numerical values from one to six points. The numerically-translated responses to each profile's group of statements are summed and averaged. These nine profile means are "mapped"

onto a grid of standardized means and standard deviations calculated from studies amassed by the scale's authors. The pattern of highs and lows of the nine profiles are categorized into five diagnostic clusters of temperament: difficult, easy, slow-to-warm-up, intermediate high, and intermediate low.

In addition to the temperament clusters determined by the authors, an overall numerical score was calculated for this study based on the diagnostic groups of McDevitt and Carey. Only five of the nine profiles were used in mapping the diagnostic clusters. The numerical values of these five profiles were summed and averaged for each child to create an overall score. A higher score indicated a more difficult temperament since the difficult cluster was originally based on high averages for the five profiles used in its pattern. A lower overall score indicated a more easy child while middle scores paralleled an intermediate temperament. Basically, the overall score was developed to provide a continuous temperament variable to be used in regression analysis. The categorical diagnostic clusters were used in analysis of variance and Chi-square analysis of growth variables.

RESOURCE:

A copy of the Behavioral Style Questionnaire may be obtained by writing:

Sean C. McDevitt, Ph.D.
Psychology Department
Terry Children's Psychiatric Center
New Castle, Delaware 19720 USA

## Change in Child's Temperament From Present

Is your child's temperament pretty much the same as it was when he/she was under three years of age? yes_____ no_____

If no, how was he/she different? | Did major changes occur in... |

| FACTOR | APPROX. AGE OF CHANGE | COMMENT |
|---|---|---|
| Activity level | | |
| Regularity of body functions | | |
| Intensity in what he/she does | | |
| Persistence | | |
| Distractibility | | |
| Mood | | |
| Threshold for attention | | |
| Reactions towards others (outgoing, withdrawn) | | |
| Adaptability to new situations | | |

## Social Support Network

Think back during the time your child was under three years of age (  to  ). Who made up your support system at that time? Please list on the right those significant people who provided personal support for you or who were important to you. If you feel that your support system changed significantly during that time, additional pages will be provided for you to list those people.

Use only first names or initials, and then indicate the relationship, as in the following example:

Example:

| | First Name or Initials | Relationship |
|---|---|---|
| 1. | M.T. | Friend |
| 2. | Bob | Brother |

Use the following list to help you think of the people important to you, and list as many people as apply in your case.

--Spouse or partner
--Family members or relatives
--Friends
--Work or school associates
--Neighbors
--Health care providers
--Counselor or therapist
--Minister/priest/rabbi
--Other

You do not have to use all 10 spaces. Use as many spaces as you have important persons in your list.



WHEN YOU HAVE FINISHED YOUR LIST, PLEASE TURN TO PAGE 2.

For each person you listed, please answer the following questions by writing in the number that applies.

| Question 1: How much could you confide in this person? | Question 2: How much did this person provide moral support? |
|---|---|
| 1 = not at all | 5 = daily |
| 2 = a little | 4 = weekly |
| 3 = moderately | 3 = monthly |
| 4 = quite a bit | 2 = a few times a year |
| 5 = a great deal | 1 = once a year or less |
| 1._____ | 1._____ |
| 2._____ | 2._____ |
| 3._____ | 3._____ |
| 4._____ | 4._____ |
| 5._____ | 5._____ |
| 6._____ | 6._____ |
| 7._____ | 7._____ |
| 8._____ | 8._____ |
| 9._____ | 9._____ |
| 10._____ | 10._____ |



This half page cut away.

PERSONAL NETWORK I.D.#_____

Question 3:
If you needed to borrow $1Ø, a ride to the doctor, or some other immediate help how much could this person have helped?

1 = not at all
2 = a little
3 = moderately
4 = quite a bit
5 = a great deal

Question 4:
How frequently did you usually have contact with this person?

5 = daily
4 = weekly
3 = monthly
2 = a few times a year
1 = once a year or less

| First Name or Initials | If this person was not in your personal network during the entire 3 years after your child was born, please indicate the time she/he was present | Relationship |
|---|---|---|
| 1. | | |
| 2. | | |
| 3. | | |
| 4. | | |
| 5. | | |
| 6. | | |
| 7. | | |
| 8. | | |
| 9. | | |
| 1Ø. | | |

NOTE: No part of the Norbeck Social Support Questionnaire may be used without prior approval by J. Norbeck.

**Family Satisfation Scale** I.D. #_____

Family can provide a support system to a person while raising a child. Please think back to when your child was under three and rate the following five statements regarding family satisfaction as you felt at that time. "Family" is the individual(s) with whom you usually lived. If you lived alone with your children, consider family as those with whom you had the strongest emotional ties.

H = Husband C = Children (Check one category only for each relationship)

| Statement | Always | Almost Always | Some of the time | Hardly Ever | Never |
|---|---|---|---|---|---|
| Overall, I was satisfied that I could turn to my _____ for help when something was troubling me. | ____ | ____ | ____ | ____ | ____ |
| Overall, I was satisfied with the way my _____ talked over things with me and shared problems with me. | ____ | ____ | ____ | ____ | ____ |
| Overall, I was satisfied that my _____ accepted and supported my wishes to take on new activities or directions. | ____ | ____ | ____ | ____ | ____ |
| Overall, I was satisfied with the way my _____ expressed affection, and responded to my emotions, such as anger, sorrow, or love. | ____ | ____ | ____ | ____ | ____ |
| Overall, I was satisfied with the way my _____ and I shared time together. | ____ | ____ | ____ | ____ | ____ |

I.D. #_____

## Relatives/Friends Satisfaction Scale

Relatives and friends also provide a good support system to parents in addition to the immediate family. Please rate the following statements as you felt about your relatives and friends when your child was under three years of age. "Friends" are the non-relatives from your community with whom you have a sharing relationship.

R = Average Relatives
R1 = Mother's Relatives
R2 = Mother's In-laws
F = Friends

(Check one category only for each relationship)

| Statement | Always | Almost Always | Some of the time | Hardly Ever | Never |
|---|---|---|---|---|---|
| Overall, I was satisfied that I could turn to my _____ for help when something was troubling me. | _____ | _____ | _____ | _____ | _____ |
| Overall, I was satisfied with the way my _____ talked over things with me and shared problems with me. | _____ | _____ | _____ | _____ | _____ |
| Overall, I was satisfied that my _____ accepted and supported my wishes to take on new activities or directions. | _____ | _____ | _____ | _____ | _____ |
| Overall, I was satisfied with the way my _____ expressed affection, and responded to my emotions, such as anger, sorrow, or love. | _____ | _____ | _____ | _____ | _____ |
| Overall, I was satisfied with the way my _____ and I shared time together. | _____ | _____ | _____ | _____ | _____ |

## List of Possible Life Events Given To Mother As Aid in Discussion

LIFE EVENTS

TOPICS: SCHOOL
-Starting
-Finishing
-Changing programs
-Quitting

WORK
-Changing jobs
-Promoted
-Demoted
-Cut in pay
-Raise in pay
-Laid off
-Fired
-Started business
-Expanded business
-Retired
-Started to work
-Returned to work after not working for a long time

MARRIAGE
-Engagement
-Married
-Separated
-Divorced
-Trouble with in-laws
-Spouse died

HEALTH
-Prolonged illness of child, spouse, other children, relatives, friends, self
-Injury to self or others
-Physical deformity acquired by self or others
-Physical health improved for self or others

HAVING CHILDREN
-Pregnancy
-Birth
-Miscarriage-stillbirth
-Adoption
-Couldn't have more children

FAMILY
-New person moved in
-Person moved out
-Family member dies
-Relative dies
-Increase in arguments
-Decrease in arguments
-Increased visits with relatives
-Decreased visits with relatives

LEGAL MATTERS
-Robbed or assaulted
-Accident
-Lost drivers license
-Law suit or court case
-Relative or friend in jail

SOCIAL ACTIVITIES
-Increased organizational activities
-Decreased organizational activities
-Vacation
-Left friends
-Close friend died
-New friends

FINANCES
-Mortgage
-Started buying on installments
-Repossession of item
-Suffered financial loss (not work)
-Large debt acquired
-AFDC, food assistance, SSI, etc.
-Made financial gains (not work)

RESIDENCE
-Moved
-Unable to move as planned
-Built home
-Remodeled home
-Lost home through disaster

TIME PERIODS

| AGE | DATES |
|---|---|
| Birth to 6 mo. | ( ) |
| 6 to 12 mo. | ( ) |
| 1 to 1 1/2 yrs. | ( ) |
| 1 1/2 to 2 yrs. | ( ) |
| 2 to 2 1/2 yrs. | ( ) |
| 2 1/2 to 3 yrs. | ( ) |

**Family Life Events***

I.D.#_____

When, if ever, did the following happen in your family during the time your child was under three?
Please check the column or columns in which the event occurred. What effect did these events have on your family?

| EVENT | CHILD'S AGE DATES: 3 to 2 1/2 ( ) | 2 1/2 to 2 ( ) | 2 to 1 1/2 ( ) | 1 1/2 to 1 ( ) | 12 to 6mo ( ) | 6mo to birth ( ) | Date(mo/yr) | Overall impact on your child, yourself and family at that time: Change for the Better | No Change | Change for the Worse | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|
| School | | | | | | | | | | | |
| Work | | | | | | | | | | | |
| Marriage | | | | | | | | | | | |
| Having Children | | | | | | | | | | | |
| Family | | | | | | | | | | | |
| Legal Matters | | | | | | | | | | | |
| Social Activities | | | | | | | | | | | |
| Finances | | | | | | | | | | | |
| Residences | | | | | | | | | | | |
| Health | | | | | | | | | | | |
| Childcare | | | | | | | | | | | |

*Condensed form of actual four page original

## APPENDIX B

## STANDARDIZED IMPACTS OF LIFE EVENTS INTERVIEW

Date: _____

Education: _____ less than high school grade 9

_____ high school but did not graduate

_____ high school graduate or GED

_____ some college or vocational training

_____ college graduate

_____advanced graduate work

Ages of your children: _____

Ethnicity: _____ Mexican American _____ Anglo

| Event<br>SCHOOL: | Large Impact | Small Impact |
|---|---|---|
| Licensing exam taken by mom (yourself)..... | _____ | _____ |
| Child changes schools..... | _____ | _____ |
| Husband gone for schooling out of town (for extended period)..... | _____ | _____ |
| Husband starts school..... | _____ | _____ |
| Mom starts school..... | _____ | _____ |
| Mom changes school program or class schedule hours | _____ | _____ |
| Child graduates..... | _____ | _____ |
| Husband graduates or stops..... | _____ | _____ |
| Mom graduates or stops..... | _____ | _____ |

SCHOOL: (continued)

Child has trouble at school..... _____ _____

Child starts school..... _____ _____

Husband changes school schedule..... _____ _____

Husband home from school for summer..... _____ _____

WORK:

Husband becomes unemployed/quits/layed off/strikes _____ _____

Husband gets new job..... _____ _____

Husband changes jobs within same place of employment..... _____ _____

Husband changes place of employment but does same kind of job..... _____ _____

Mom becomes unemployed/quits/layed off/strikes... _____ _____

Mom starts new job outside of home (or returns to work)..... _____ _____

Mom changes jobs within same place of employment. _____ _____

Mom changes place of employment but does same kind of job..... _____ _____

Mom starts new job within home (ex. babysitting). _____ _____

Husband increases working hours or changes schedule..... _____ _____

Husband changes to different job and place of employment..... _____ _____

Mom changes work routine hours..... _____ _____

Husband erratically holds job or many jobs for short amount of time..... _____ _____

Husband returns to work after layed off/strike... _____ _____

Mom changes place of employment and job..... _____ _____

Husband starts own business..... _____ _____

WORK: (continued)

Husband asks mom to quit work..... _____ _____

Child begins work..... _____ _____

Child layed off..... _____ _____

Husband moonlighting (side job)..... _____ _____

Husband rejected from job application..... _____ _____

MARRIAGE:

Separated..... _____ _____

Filed for divorce..... _____ _____

Divorce final..... _____ _____

Reconciled..... _____ _____

Husband's drinking problem continues..... _____ _____

Husband's drinking problem ends..... _____ _____

Husband beats wife..... _____ _____

Tension increases in marriage..... _____ _____

Tension decreases in marriage..... _____ _____

Mom and dad married..... _____ _____

Mom does not see dad anymore..... _____ _____

Mom starts dating after divorce..... _____ _____

Mom and dad still married but work schedule does not permit their spending time together anymore _____ _____

Further legal struggles with divorce..... _____ _____

CHILDREN - FAMILY:

Pregnant..... _____ _____

Child born..... _____ _____

CHILDREN - FAMILY: (continued

| | | |
|---|---|---|
| Relative(s) move in (other than your parents or in-laws) | _____ | _____ |
| Relative(s) move out (other than your parents or in-laws) | _____ | _____ |
| Relative dies (others than your parents or in-laws) | _____ | _____ |
| Ex-husband visits child on periodic basis | _____ | _____ |
| Boyfriend moves in and lives with mom and child | _____ | _____ |
| Boyfriend moves out | _____ | _____ |
| Parent or in-law moves in | _____ | _____ |
| Parent or in-law moves out | _____ | _____ |
| Parent or in-law dies | _____ | _____ |
| Trouble with parent(s) | _____ | _____ |
| Trouble with relatives other than parents or mom/dad-in-law | _____ | _____ |
| Trouble with mother-in-law or father-in-law | _____ | _____ |
| Visited dying parent | _____ | _____ |
| Non-relative moves in | _____ | _____ |
| Non-relative moves out | _____ | _____ |
| Step children move in | _____ | _____ |
| Step children move out | _____ | _____ |
| Child moves out of house | _____ | _____ |
| Relative divorced or separated | _____ | _____ |
| Family member or friend engaged or married | _____ | _____ |
| Ex-husband no longer sees child | _____ | _____ |
| Abortion or stillbirth | _____ | _____ |

CHILDREN - FAMILY: (continued)

| | | |
|---|---|---|
| Close relative leaves town..... | _____ | _____ |
| Reconcilliation of relative problem..... | _____ | _____ |
| Difficult period caring for new baby..... | _____ | _____ |
| Left child with relatives for brief period (few days)..... | _____ | _____ |
| Husband has vasectomy..... | _____ | _____ |
| Relative born..... | _____ | _____ |
| Decreased visits with relatives over time..... | _____ | _____ |
| Husband has no contact with children from his previous marriage..... | _____ | _____ |
| Mom sterilized..... | _____ | _____ |
| Relative/friend visits briefly (few days)..... | _____ | _____ |
| Child lost for few hours outside..... | _____ | _____ |
| Mom decreases visits with children from previous marriage..... | _____ | _____ |
| Increased visits with relatives over time..... | _____ | _____ |
| Mom accepts new child after first having hard time bonding..... | _____ | _____ |
| Child wets bed consistently..... | _____ | _____ |
| Older child moves back into home..... | _____ | _____ |
| Relative moves closer..... | _____ | _____ |
| Children's dad visits them for extended time (mom remarried)..... | _____ | _____ |
| Your family moves in with your parents/in-laws/ relatives..... | _____ | _____ |
| Your family moves out from your parents/in-laws/ relatives..... | _____ | _____ |

LEGAL MATTERS AND FINANCES:

| | | |
|---|---|---|
| Car accident by family member/relative (not serious) | _____ | _____ |
| Drop in finances | _____ | _____ |
| Extra expenses incurred (house, land, medical treatment) | _____ | _____ |
| Increase in finances | _____ | _____ |
| Husband in jail | _____ | _____ |
| Husband out of jail | _____ | _____ |
| Sued - family member is defendant | _____ | _____ |
| Sued - family member is plaintiff | _____ | _____ |
| Court proceedings for stepchildren to gain custody | _____ | _____ |
| Unstable finances (up and down) | _____ | _____ |
| Relative in jail | _____ | _____ |
| Child support proceedings against ex-husband in progress | _____ | _____ |
| Husband arrested | _____ | _____ |
| Goes on AFDC, food stamps or other welfare | _____ | _____ |
| Father stops supporting child | _____ | _____ |
| Sold item - couldn't make payments or needed money | _____ | _____ |
| Hired lawyer and high fees | _____ | _____ |
| Finances steadily declining | _____ | _____ |
| Finances tight for a long time | _____ | _____ |
| Finances increase steadily | _____ | _____ |
| House robbed | _____ | _____ |
| Neighbor victimized (attempted kidnap) | _____ | _____ |

LEGAL MATTERS AND FINANCES: (continued)

| | | |
|---|---|---|
| Switched lawyers in suit..... | _____ | _____ |
| Church entirely supports family financially..... | _____ | _____ |

SOCIAL ACTIVITIES:

| | | |
|---|---|---|
| Family visits out of town (vacation)..... | _____ | _____ |
| Increase in social activities for mom..... | _____ | _____ |
| Change in church attendance..... | _____ | _____ |
| Child's friend moves away..... | _____ | _____ |
| Change in friends for mom..... | _____ | _____ |
| New neighbors..... | _____ | _____ |
| Increase in social activities for dad..... | _____ | _____ |
| Child increases social contacts..... | _____ | _____ |
| Close friendship of person with mom gets worse... | _____ | _____ |
| Friend or relative leaves mom's support network.. | _____ | _____ |
| Pet introduced into home..... | _____ | _____ |
| Decrease in social activities for mom..... | _____ | _____ |
| Vacation for you and your husband alone..... | _____ | _____ |
| Pet leaves home..... | _____ | _____ |
| Changes church..... | _____ | _____ |
| Mom takes vacation from work and stays at home... | _____ | _____ |
| Dad takes vacation from work and stays at home... | _____ | _____ |
| Child becomes closer as a friend to another adult..... | _____ | _____ |
| Friend of family dies..... | _____ | _____ |
| Mom sees counselor..... | _____ | _____ |
| Mom stops seeing counselor..... | _____ | _____ |

RESIDENCE:

| | | |
|---|---|---|
| Moves within town | _____ | _____ |
| Remodels own house | _____ | _____ |

HEALTH:

| | | |
|---|---|---|
| Relative hospitalized/injured/chronically ill | _____ | _____ |
| Minor illness for child | _____ | _____ |
| Mom ill (minor) | _____ | _____ |
| Child is colicy baby | _____ | _____ |
| Major illness of child/hospitalized/emergency room visit | _____ | _____ |
| Child has chronic illness (ex. ear infection) | _____ | _____ |
| Alcoholic relative gets worse | _____ | _____ |
| Child poisoned/overdose/accident | _____ | _____ |
| Relative attempts suicide | _____ | _____ |
| Child undergoes extensive medical examination (ex. heart murmur test) or treatment (foot braces) | _____ | _____ |
| Depression or mental illness of family member | _____ | _____ |
| Husband ill (minor) | _____ | _____ |
| Mom ill (major) | _____ | _____ |
| Husband ill (major) | _____ | _____ |
| Tubes put in child's ear after many infections | _____ | _____ |
| Change of doctor | _____ | _____ |
| All family members ill at once | _____ | _____ |
| Highly active child seen by counselor | _____ | _____ |
| Friend ill or surgery | _____ | _____ |
| Child gets eye glasses | _____ | _____ |

CHILDCARE:

| | | |
|---|---|---|
| Began childcare with individual sitter for the first time..... | _____ | _____ |
| Began daycare center for the first time..... | _____ | _____ |
| Change in sitters..... | _____ | _____ |
| Change daycare centers..... | _____ | _____ |
| Numerous sitters within short time period..... | _____ | _____ |
| Change in sitting hours..... | _____ | _____ |

# APPENDIX C

## TYPES OF LIFE EVENTS RECALLED BY 83 MOTHERS IN FAMILY ENVIRONMENT INTERVIEW

### 100's School

| Code | Event |
|---|---|
| 101 | Licensing exam taken by mother |
| 102 | Sibling of study child changes schools |
| 103 | Husband out of town for school |
| 104 | Husband in school |
| 105 | Mother in school |
| 106 | Mother changes school program or class schedule |
| 107 | Sibling of study child graduates |
| 108 | Husband stops school |
| 109 | Mother stops school |
| 110 | Sibling of study child quits school |
| 111 | Husband comes home from school for the summer |
| 112 | Husband changes school schedule |
| 113 | Sibling of study child starts school |
| 114 | Sibling of study child has trouble at school |

### 200's Work

| | |
|---|---|
| 201 | Husband becomes unemployed/quits/layed off/strikes |
| 202 | Husband gets new job |
| 203 | Husband changes position within job - same place of employment |

200's Work--Continued

204 Husband changes place of employment - same type of job

205 Mother becomes unemployed/quits/layed off/strikes

206 Mother starts new job outside of home (or returns to work)

207 Mother changes position within job - same place of employment

208 Mother changes place of employment - same type of job

209 Mom starts new job within home (ex. babysitting)

210 Husband increases working hours or changes schedule

211 Husband changes career (different job and place of employment

212 Mother changes work hours or schedule

213 Husband erratically holds jobs or numerous ones in sequence

214 Husband returns to work after layed off or strike

215 Mother changes career (different job and place of ment)

216 Husband starts own business

217 Husband asks mother to quit work

218 Sibling of study child begins work

219 Sibling of study child layed off

220 Husband moonlighting (side job)

221 Husband rejected from job application

300's Marriage

301 Separated

302 Filed for divorce

**300's Marriage** (continued)

303 Divorce final

304 Reconciled

305 Husband's drinking problem continues

306 Husband's drinking problem ends

307 Husband beats wife

308 Tension increases in marriage

309 Tension decreases in marriage

310 Mother and father of study child married

311 Mother does not see husband anymore

312 Mother and stepfather of study child begin dating

313 Mother and husband's work schedules do not permit their spending time together anymore

314 Further legal struggles with divorce

**400's Having Children and Family**

401 Pregnancy

402 Sibling of study child born

403 Relative(s) move in with family (other than mother's parents or in-laws)

404 Relative(s) move out (other than mother's parents or in-laws)

405 Relative dies (other than mother's parents or in-laws)

406 Ex-husband visits child on periodic basis

407 Boyfriend of mother's moves in with her and child(ren)

408 Boyfriend of mother's moves out

409 Mothers starts new relationship with a man

**400's Having Children and Family--Continued**

410 Parent or in-law moves in with family

411 Parent or in-law moves out

412 Parent or in-law dies

413 Trouble with mother's parent(s)

414 Trouble with relatives

415 Trouble with mother's in-laws

416 Mother visits dying relative

417 Non-relative moves in with family

418 Non-relative moves out

419 Stepchild(ren) move in with family

420 Stepchild(ren) move out

421 Sibling of study child moves out of house

422 Relative divorced or separated

423 Family member of friend engaged or married

424 Ex-husband no longer sees child

425 Abortion or stillbirth

426 Close relative leaves town

427 Reconciliation of relative problem

428 Difficult period with new sibling of study child

429 Mother and husband leave child(ren) with relatives for brief period

430 Husband has vasectomy

431 Relative is born

432 Decrease visits with relatives

**400's Having Children and Family--Continued**

433 Husband has no contact with children from his previous marriage

434 Mother is sterilized

435 Relative/friend visits briefly

436 Study child lost for brief time outside

437 Mother decreases visits with children from previous marriage

438 Increase visits with relatives

439 Mother accepts new baby after first having a difficult time bonding

440 Sibling of study child wets bed

441 Sibling of study child moves back into house

442 Relative(s) move closer

443 Father of study child visits child(ren) for extended time (mother remarried)

444 Family moves in with parents/in-laws/relatives

445 Family moves out

**500's Legal Matters and Finances**

501 Car accident by family member/relative

502 Drop in finances

503 Extra expenses incurred (house, land, medical treatment)

504 Increase in finances

505 Husband jailed

506 Husband released from jail

507 Sued-family member is defendant

508 Sued-family member is plaintiff

**5ØØ's Legal Matters and Finances**--Continued

509 Court proceedings for stepchildren

510 Unstable finances (up and down)

511 Relative in jail

512 Child support proceedings against ex-husband in progress

513 Husband arrested

514 AFDC or food stamps - Federal assistance

515 Ex-husband stops supporting child(ren)

516 Family sold item - couldn't make payments or needed money

517 Hired lawyer and high fees

518 Finances steadily declining

519 Finances tight (since birth)

520 Finances increase steadily

521 Robbed

522 Neighbor victimized (attempted kidnapping)

523 Switched lawyers in suit)

524 Church entirely supports family financially

**6ØØ's Social Activities**

601 Family visits out of town (vacation)

602 Increase in social activities by mother

603 Change in church attendance

604 Study child's friend moves away

605 Change in friends for mother

606 New neighbors

607 Increase in social activities by husband

**600's Social Activities--Continued**

608 Child increases social contacts

609 Increase in social activities by siblings

610 Friendship of person with mother decompensates

611 Friend or relative leaves mother's support network

612 Pet introduced into home

613 Decrease in social activities for mother

614 Vacation for mother and husband alone

615 Pet leaves home

616 Family changes church

617 Mother takes vacation from work and stays at home

618 Husband takes vacation from work and stays at home

619 Study child becomes closer as a friend to another adult

620 Friend of family dies

621 Mom sees counselor

622 Mom stops seeing counselor

**700's Residence**

701 Family moves within town

702 Family remodels own house

**800's Health**

801 Relative hospitalized/injured/chronically ill

802 Minor illness for child

803 Mother ill (minor)

804 Child is colicy baby

## 800's Health --Continued

805 Sibling of study child ill-major or accident

806 Major illness of child/hospitalized/emergency room visit

807 Study child has chronic illness (ex. ear infection)

808 Alcoholic relative decompensates

809 Study child poisoned/overdose/accident

810 Relative attempts suicide

811 Study child undergoes extensive medical exam or treatment

812 Depression or mental illness of family member

813 Husband ill (minor)

814 Tubes put in study child's ear

815 Change of family doctors

816 All family members ill at once

817 Highly active study child seen by counselor

818 Friend ill/surgery

819 Sibling of study child gets glasses

820 Mother seriously ill

821 Husband seriously ill

822 Sibling of study child minor illness

## 900's Childcare

901 Began childcare

902 Began daycare center

903 Changed sitters

904 Stopped sitters

905 Changed daycare centers

900's Childcare--Continued

906 Stopped daycare

907 Numerous sitters within short time period

908 Changed sitting hours

# APPENDIX D

## STANDARDIZED IMPACTS OF LIFE EVENTS*

| Large | | | | Small | Ambiguous | |
|---|---|---|---|---|---|---|
| 101 | 308 | 429 | 901 | 106 | 102 | 504 |
| 103 | 311 | 436 | 902 | 112 | 104 | 511 |
| 105 | 312 | 437 | 903 | 203 | 107 | 516 |
| 110 | 313 | 439 | 905 | 204 | 108 | 520 |
| 111 | 314 | 440 | 907 | 207 | 109 | 523 |
| 113 | 401 | 443 | | 208 | 202 | 601 |
| 114 | 402 | 444 | | 418 | 209 | 602 |
| 201 | 403 | 502 | | 422 | 210 | 604 |
| 205 | 405 | 503 | | 423 | 218 | 605 |
| 206 | 407 | 505-510 | | 432 | 219 | 607 |
| 211 | 408 | 512-515 | | 435 | 221 | 608 |
| 212 | 409 | 517-519 | | 438 | 309 | 609 |
| 213 | 410 | 521,522 | | 442 | 310 | 612 |
| 214 | 412 | 524 | | 603 | 404 | 615 |
| 215 | 413 | 610 | | 606 | 406 | 617 |
| 216 | 414 | 611 | | 613 | 411 | 618 |
| 217 | 415 | 614 | | 616 | 426 | 619 |
| 220 | 416 | 620-621 | | 622 | 427 | 702 |
| 301 | 417 | 701 | | 802 | 430 | 818 |
| 302 | 419 | 801 | | 803 | 431 | 904 |
| 303 | 420 | 804-812 | | 813 | 433 | 906 |
| 304 | 421 | 814 | | 815 | 434 | 908 |
| 305 | 424 | 816,817 | | 819 | 441 | |
| 306 | 425 | 820 | | 822 | 445 | |
| 307 | 428 | 821 | | | 501 | |

*Event numbers similar to those in Appendix C.

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