

**THE INFLUENCE OF MATERNAL PSYCHOSOCIAL FACTORS AND HOUSEHOLD  
COMPOSITION ON INFANT FEEDING OUTCOMES**

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## **ABSTRACT**

Katherine J. Barrett: The Influence of Maternal Psychosocial Factors and Household Composition on Infant Feeding Outcomes  
(Under the direction of Amanda L. Thompson)

The present study explores if maternal psychosocial factors, specifically self-esteem and depressive symptomology, and the presence of an infant's grandmother in the household influence infant feeding styles and nutritional outcomes for infants nine months of age. Participants include 160 low-income, African-American mother-infant pairs in central North Carolina. Results indicate that parental self-efficacy, parental satisfaction, and depressive symptomology are significantly associated with infant feeding styles but not inappropriate feeding. Parental self-efficacy is positively associated with restrictive practices, whereas satisfaction is negatively associated with pressuring practices. Depression is associated with pressuring feeding styles. The presence of an infant's grandmother in many cases modifies these relationships to protect against inappropriate feeding.

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## **CHAPTER 1 – INTRODUCTION**

Obesity is an important emerging health issue in the United States because of its increasing impact and implications for socioeconomic inequalities. Obesity rates beginning in early childhood are much higher among racial minorities than among non-Hispanic Whites (Ogden et al., 2014). Current research and intervention efforts often target nutrition in school-aged children, because obese children are much more likely to exhibit type II diabetes, signs of cardiovascular risk, and continued obesity into adulthood (Baker, Olsen and Sørensen, 2007; Stettler et al., 2003; Weiss et al., 2004). Yet there is evidence that the early childhood nutritional environment, especially feeding practices and nutritional outcomes for infants and toddlers, can set the stage for a person's risk of obesity and chronic disease over the life course (Thompson, 2012). The nutritional environment is one aspect of the broader developmental environment in which a child is raised. The developmental environment—itsself fashioned by parental, household, community and cultural factors—influences a child's biological, psychological, and social developmental trajectories. This project uses an ecocultural theoretical framework to examine how maternal and household factors shape an infant's nutritional environment.

Ecocultural theory integrates “nature” and “nurture” conceptualizations of child-rearing to illustrate how culture becomes embodied during child development (Worthman, 2010b). It draws from psychocultural studies that focus on the developmental niche, or the microenvironment in which a child grows and matures, which is fashioned by a confluence of cultural beliefs, values, and practices (Super and Harkness, 2002; Worthman, 2010a). The dietary environment is an important aspect of this developmental niche and includes feeding

styles—or parents’ practices and behaviors that are shaped by their beliefs and attitudes about feeding—and dietary composition. Ecocultural theory recognizes that parents’ abilities to enact particular cultural models or scripts, such as culturally informed feeding practices, are contingent upon their own psychology and immediate environment (Super and Harkness, 1986; Whiting and Whiting, 1975). This study examines data from the Infant Care and Risk of Obesity Project in central North Carolina to investigate how maternal psychosocial factors and household composition may contribute to creating particular dietary environments that shape the trajectories of developing infants.

Although there are several aspects of parental psychology one might consider, current research suggests that maternal self-esteem may influence an infant’s developmental trajectory. Maternal self-esteem has been found to moderate the relationship between infant temperament and weight (Anzman-Frasca et al., 2013), which may in part be explained by a negative association between maternal self-esteem and controlling feeding practices (Mitchell et al., 2009). However, there is still a need to investigate these relationships in low-income and minority populations and additionally to understand if and how an infant’s diet may be influenced. To explore the mechanisms through which the relationship between maternal psychosocial factors and infant development might operate, the present study analyzes how maternal individual self-esteem and parental self-esteem, composed of self-efficacy and satisfaction domains, each influence the infant’s dietary environment. Additionally, because maternal depression has been associated with many aspects of children’s developmental environment (Braungart-Rieker et al., 2014; Rahman et al., 2004; Rodgers et al., 2014), this study evaluates the influence of maternal depressive symptomology on the dietary environment.

Finally, household composition exerts significant influence on children's developmental trajectories, and the role of grandparents is particularly strong (Augustine and Raley, 2013; Black and Nitz, 1996; Spieker and Bensley, 1994; Whiting and Whiting, 1975). This is especially true when it comes to children's dietary environments (Jingxiong et al., 2007; Speirs et al., 2009), as many mothers rely on grandmothers for advice and support (Bentley et al., 1999b; McLorg and Bryant, 1989; Wasser et al., 2013). This study examines the role of grandmothers in the household and whether or not their presence influences mothers' feeding decisions and practices compared to other household structures.

## CHAPTER 2 – LITERATURE REVIEW

How exactly the environment and social processes get “under the skin” to influence human physiology is a major concern within biological anthropology. An ecological model considers interactions among the physical, social, and cultural environments and human biology (Pelto and Freake, 2003). Ecocultural theory extends this model to provide a framework for thinking about how various influences shape the developmental environment. Ecocultural theory holds that the individual child possesses dispositions and capacities that are shaped by evolutionary processes, and individual development itself unfolds within broader contexts shaped by cultural and historical forces (Worthman, 2010a). Early work in the anthropology of child development led to the theorization that culture acts through proximal conditions of child development, especially in early childhood experiences (Whiting and Edwards, 1988; Whiting and Whiting, 1975; Worthman, 2010a). The importance of studying the child *in context*, which includes the immediate family environment as well as broader social systems in which an individual is embedded, is critical for understanding how an individual develops (Bronfenbrenner, 1979). The concept of the developmental niche, borrowed and modified from biological ecology, describes the context for the biological, psychological, and social development of individual children (Super and Harkness, 1986).

The developmental niche is a framework that accounts for the influences of the physical and social settings of children, the customs of care and rearing practiced by parents and caregivers, and caretaker psychology (Super and Harkness, 1986). It is a fluid, open system that modifies and is modified by the developing individual, participating caregivers, and broader

community structures. The physical and social contexts that shape the developmental niche shape individual physiology, which in turn provides feedback that shapes the developmental niche (Harkness and Super, 1994; Worthman, 2003; Worthman, 2010a). Anthropologists have studied several aspects of the developmental niche in relation to the development of obesity, including parents' education, employment, and income (Crooks, 1999; Crooks, 2000), and household and mealtime interactions (Brewis, 2003; Brewis and Gartin, 2006). This study considers the dietary environment, a milieu in which parents, other caregivers and infants interact to create dynamic feedback systems that influence infant growth. Two aspects of the dietary environment considered here are infant feeding styles and nutritional outcomes. This study also considers how maternal psychosocial characteristics and the presence of other caregivers might influence the creation of a particular dietary environment.

### **Dietary Environment: Feeding Styles and Nutritional Outcomes**

Rapid or excessive weight gain in infancy is associated with increased risk of obesity later in life (Baird et al., 2005; Monteiro and Victora, 2005; Ong and Loos, 2006), and the feeding styles parents employ may help explain how differential growth trajectories may develop. Feeding style is an important component of the dietary environment and developmental niche, and attitudes and approaches to infant feeding vary widely (Dettwyler, 1989; Hodges et al., 2008). There is evidence that feeding styles, which encompass both parental attitudes toward feeding interactions and the associated practices (Thompson, Adair and Bentley, 2013), are associated with child weight status (Birch and Fisher, 1998; Birch and Fisher, 2000; Hughes et al., 2005; Johnson and Birch, 1994; Thompson, Adair and Bentley, 2013). Research in this area suggests that feeding styles reflect domain-specific parenting (Costanzo and Woody, 1985) that can be assessed with the appropriate measurement tools (Birch et al., 2001; Thompson et al.,

2009). Feeding styles may develop as early as infancy (Thompson et al., 2009) and remain stable throughout early childhood (Blissett and Farrow, 2007; Duke et al., 2004).

Controlling feeding styles, specifically pressuring and restriction, are associated with infant growth and dietary outcomes (Thompson, Adair and Bentley, 2013). Pressuring, which includes pressuring to finish meals or the instrumental use of food (Thompson et al., 2009), is associated with higher energy intake and lower weight-for-age *z*-scores among infants (Thompson, Adair and Bentley, 2013). It is also associated with increased reliance on external cues to finish eating and decreased responsiveness to energy density in the diet, indicating less sensitivity to internal cues of satiety (Birch and Fisher, 1998). It may also lead to decreased preference for the foods with which parents pressure (Birch, 1999).

The restrictive feeding style, which includes restricting foods perceived to be unhealthy or the amount of food consumed (Thompson et al., 2009), is associated with lower energy intake (Thompson, Adair and Bentley, 2013). As with pressuring, restriction may affect children's taste preferences; in this case it is associated with an increased preference for restricted foods (Fisher and Birch, 1999). Among young children, it is also associated with eating in the absence of hunger, higher energy intake, higher BMI, and prevalence of overweight (Faith and Kerns, 2005; Fisher and Birch, 2002).

As a component of the developmental niche that influences behavioral patterns over the life course, these feeding styles focus infant's and children's attention on external rather than internal cues for initiating and terminating feeding and furthermore are linked to poorer self-regulation later in life (Fisher and Birch, 2000; Johnson and Birch, 1994). Additionally, both pressuring and restriction are associated with overall pickiness (Moroshko and Brennan, 2013), which in turn is associated with decreased consumption of fruits and vegetables (Galloway et al.,

2005). These feeding styles are not mutually exclusive and in some cases may actually operate in concert. In a study of 5-year-old girls and their parents, parents who reported pressuring styles were more likely to report restriction as well (Carper, Fisher and Birch, 2000). However, this was not the case among African-American mothers in North Carolina (Thompson et al., 2009), indicating that it is important to understand what influences feeding styles among different populations.

In addition to exhibiting particular feeding styles, caregivers determine the types of foods infants and young children can access. Complementary foods often are defined as foods and drinks other than breast milk or infant formula that are consumed during the same period as breast- and formula feeding. The American Academy of Pediatrics (AAP) recommends feeding breast milk or formula exclusively for the first six months of life and introducing complementary foods shortly thereafter (Eidelman et al., 2012). Macronutrient composition—particularly of protein and fat—is important for the maturation of various biological processes such as psychomotor development and visual functioning (Agostoni, 2008) and impacts the rate at which infants gain mass (Thompson, 2012).

A 5-country European study found that formula-fed infants who received complementary foods prior to 22 weeks of age grew faster and were heavier at 24 months than infants who did not, yet there was not strong evidence that this influenced overall weight-for-length (Grote et al., 2011). A study that compared infant feeding practices in the United States, China, and Mexico found that the timing and progression of the introduction of complementary foods did explain some of the variations in growth, particularly between China and the United States (Woo et al., 2013). Both studies suggest that the types and quality of complementary foods infants receive may be important for understanding the relationship between feeding practices and growth.

## **Maternal Characteristics**

Caregiver psychology, especially maternal mental health, is an important factor that can influence the developmental niche (Super and Harkness, 1986). Few studies have examined the relationship between child growth and maternal self-esteem or self-efficacy. A study in Australia found no relationship between maternal self-esteem and BMI (Gibson et al., 2007), whereas a recent study in the U.S. found that maternal self-efficacy moderates the relationship between child temperament and weight, such that children with higher negativity scores have lower BMIs when their mothers have higher self-efficacy scores (Anzman-Frasca et al., 2013). Studies of the feeding environment may elucidate mechanisms that help explain this phenomenon.

In contrast to the paucity of data regarding maternal self-esteem or self-efficacy and child growth, there have been numerous studies examining the relationship between maternal depression and child growth. Although maternal depression has been associated with food insecurity (Casey et al., 2004; Laraia, Borja and Bentley, 2009), poorer child health (Casey et al., 2004; Rahman et al., 2004) and negative parenting behaviors (Braungart-Rieker et al., 2014; McCurdy et al., 2014), its influence on child weight and obesity risk is equivocal. Some studies show that maternal depression is associated with smaller infants (Traviss, West and House, 2012), while others identify a positive correlation between maternal depression and child BMI (Morrissey and Dagher, 2014; Surkan, Kawachi and Peterson, 2008), weight (Surkan, Kawachi and Peterson, 2008), and adiposity (Ertel et al., 2010). Yet others identify no relationship at all (Ajslev et al., 2010; Braungart-Rieker et al., 2014; Grote et al., 2010; McCurdy et al., 2014) or find that the relationship varies by child age and gender (Duarte et al., 2012). There is evidence that maternal depression early in childhood may affect weight later in life. A longitudinal study in the United States found that children whose mothers exhibited depression between 0 and 36



months were more likely to be overweight in grades 1 through 6, and longer exposure to maternal depression was associated with a higher risk of childhood overweight (Wang et al., 2013). The infant and early childhood dietary environment may provide one pathway through which this association operates.

Several studies of infant and child feeding have found that maternal psychosocial characteristics may impact feeding style outcomes. A study of mothers with infants in Maryland found that maternal stress, anxiety, and depressive symptomology were positively associated with pressuring feeding styles (Hurley et al., 2008). Anxiety has also been associated with restrictive feeding styles among mothers with one-year-olds (Farrow and Blissett, 2005). Among parents with older children, maternal depressive symptomology has been associated with pressuring feeding styles, although not necessarily restriction (Farrow and Blissett; Francis, Hofer and Birch, 2001; Haycraft, Farrow and Blissett, 2013). An Australian study did find positive associations between maternal stress, anxiety, and depressive symptomology and both the pressuring and restrictive feeding styles, while maternal satisfaction and efficacy were negatively associated with these feeding constructs (Mitchell et al., 2009). Further research may help to identify the degree of influence between these various psychosocial characteristics and feeding styles.

### **Household Composition**

The developmental niche considers all types of interactions that influence an individual's development, and other household caregivers are part of that story. Although feeding occurs outside the household (such as at daycare and school), biocultural research among Mexican children suggests that influences *inside* the household largely account for weight variation

among peers (Brewis, 2003). Fathers do influence the dietary environment, but their level of influence may vary based on their relationships with infants' mothers (Wasser et al., 2013).

Cross-culturally, grandmothers are present and active advisors and caregivers for infants and growing children, and they often influence children's nutritional environments (Aubel, 2012). Grandparents worldwide are commonly involved in childcare, food purchasing, and food preparation and therefore influence children's nutritional intake (Goh, 2013; Jingxiong et al., 2007; Speirs et al., 2009). The results of that influence are not necessarily clear. A study in the United Kingdom found that grandparents often provide a healthier food environment, such as supplying healthier foods and allowing children to regulate their own intake, but they also demonstrate some maladaptive techniques, such as using food as a reward or for emotional regulation (Farrow 2014).

Mothers in the United States frequently cite the infants' maternal grandmothers as primary advisors (Heinig et al., 2009; McLorg and Bryant, 1989) and important sources of support and information (Bowman, 2006; Hannon et al., 2000; Karp, Lutenbacher and Dietrich, 2010). Studies among low-income African American mothers find that the presence of maternal grandmothers, particularly when mothers are very young, influences feeding practices and the introduction of solid foods, especially the early introduction of cereal in the bottle (Bentley et al., 1999b; Wasser et al., 2013). However, little research has examined how grandmothers may influence complementary feeding later in infancy. There is evidence of high rates of inappropriate feeding and low rates of feeding the recommended fruit and vegetable servings per day among young and low-income mothers (Barton, 2001; Karp, Lutenbacher and Dietrich, 2010), but how grandmothers influence these decisions, and whether or not their presence in the household matters, is unclear.

## **CHAPTER 3 – METHODS**

### **Sample**

The Infant Care, Feeding and Risk of Obesity Project was conducted between 2003 and 2006 in Orange, Wake, and Durham counties in central North Carolina. The project was an observational study of African-American mother-infant dyads designed to assess household factors that influence infant feeding patterns, such as infant feeding styles and diet, and the risk of obesity. Healthy, first-time mothers aged 18 to 35 years old with healthy infants were recruited from local Supplemental Food Program for Women, Infants, and Children (WIC) clinics. Healthy mothers were identified as those who had no serious health problems requiring regular treatment and no history of substance abuse. Healthy infants were identified as those who completed at least 35 weeks of gestation, did not have a chronic or congenital illness, were not diagnosed with failure to thrive, and were not receiving medical treatment that could interfere with dietary intake or growth. The analytic sample focuses on mothers of infants 9 months of age in Phases I and II with the aim of contributing to our understanding of the early complementary feeding environment. A 9-month cross-section was selected because by the time of this interview, all infants were receiving complementary foods. Therefore, infants had already been exposed to a relatively wide variety of food, and inappropriate feeding was readily identifiable based on the diet histories and recalls provided by mothers.

Phase I of the study consisted of semi-structured ethnographic interviews in mothers' homes. Its aims included identifying culturally specific characterizations of feeding and household or other contextual factors that may influence the development of obesity among

African-American children. Twenty mothers participated in this phase of the study; single parity was not a requirement for inclusion. The interviews included in the present analysis were from the six mothers who had infants approximately 9 months of age. The aim was to understand what influenced mothers during this particular stage of infant development, a time during which infants are learning to eat a variety of complementary foods in preparation for the transition to a fully solids-based diet.

Phase II of the study consisted of in-home interviews conducted when infants were 3, 6, 9, 12, and 18 months old. The present study analyzed cross-sectional data from the 9-month visit; 160 of the 217 mothers originally recruited in Phase II remained in the study and were interviewed. Maternal psychosocial characteristics were evaluated using the Rosenberg Self-Esteem Scale (Gray-Little, Williams and Hancock, 1997), the Parental Sense of Competence Scale (Johnston and Mash, 1989), and the Center for Epidemiologic Studies Depression Scale (CES-D) (Radloff, 1977). Mothers were given the option to self-administer the Rosenberg and CES-D assessments. Infant feeding styles were measured using the Infant Feeding Style Questionnaire (IFSQ) (Thompson et al., 2009). Infant diet histories and 24-hour food recalls were also collected during the home visits. Two additional 24-hour dietary recalls were collected by telephone on random, nonconsecutive days within two weeks of the home visit. The study was approved by the School of Public Health Institutional Review Board at the University of North Carolina at Chapel Hill.

### **Feeding Style Outcomes**

Infant feeding styles were measured using the IFSQ (Thompson et al., 2009). Although 6 constructs and 13 subconstructs were measured, only pressuring and restrictive feeding constructs and the associated subconstructs—all categorized as controlling feeding styles—were

tested in the models because they are the only feeding styles significantly associated with infant growth outcomes (Thompson, Adair and Bentley, 2013). The pressuring feeding style is characterized by a concern for increasing the amount of food consumed by the infant, and its sub-constructs include pressuring with cereal, pressuring to finish a meal, and pressuring to soothe (Thompson et al., 2009). The restrictive feeding style is characterized by concerns for regulating the nutritional quality and limiting the amount of food consumed by the infant (Thompson et al., 2009). Therefore its sub-constructs include restriction in diet quality and restriction in amount of food. All constructs and sub-constructs were measured on a scale from 1 to 5 with higher scores indicating higher levels of controlling styles among mothers. To examine overall controlling practices, combined restrictive and pressuring scores were created. Pearson's correlation testing indicated that pressuring with cereal was significantly correlated with pressuring to soothe ( $r = .38, p < .001$ ) and pressuring to finish ( $r = .21, p < .01$ ), although pressuring to soothe and pressuring to finish were not significantly correlated. Restriction in amount and restriction in diet quality were weakly correlated ( $r = .16, p < .05$ ), but the relationship was significant.

### **Dietary Outcomes**

Infant dietary outcomes were assessed using information obtained from 24-hour dietary recalls and food histories. The Nutrition Data System for Research (version 2005; Nutrition Coordinating Center, University of Minnesota, Minneapolis) was used to administer and analyze 24-hour dietary recalls. Specific dietary components that were analyzed included: mean number of fruit and vegetable servings per day, mean calories (in kcal) per day from fruits and vegetables, mean percentage of total calories per day from fruits and vegetables, and mean total calories per day.

Additionally, inappropriate feeding measures based on the AAP 2009 guidelines for 9-month-old infants were used to assess infant dietary outcomes (Barness, 2009). All measures were dichotomous and defined as allowing infants to consume foods with added sugars and salts, sweetened or carbonated beverages, or French fries. The specific variables assessed included:

- Inappropriate sweetened beverages, such as sodas and flavored milks.
- Inappropriate sweetened snacks, such as cookies and ice cream.
- Inappropriate sweets, an umbrella measure encompassing sweetened beverages and snacks.
- Inappropriate feeding, which includes salty snacks and french fries in addition to sweets.

### **Maternal Psychosocial Characteristics**

To assess maternal psychosocial factors that may influence infant feeding styles, three measures of self-esteem and one measure for risk of depression were included as exposures in statistical models. Individual self-esteem was measured using the Rosenberg Self-Esteem scale (Gray-Little, Williams and Hancock, 1997), an assessment that includes ten statements with which respondents agreed on a 4-point Likert scale (1 = strongly agree; 4 = strongly disagree) (Appendix A). The total possible score ranged from 10 to 40, with higher scores indicating higher levels of self-esteem.

Parental self-esteem was measured using the Parental Sense of Competence scale which includes two separate measures: self-efficacy and satisfaction (Johnston and Mash, 1989). Parental self-efficacy was measured using eight statements with which respondents agreed on a 6-point Likert scale (1 = strongly agree; 6 = strongly disagree) (Appendix B). Responses were reverse scored, and the total possible score ranged from 8 to 48. Parental satisfaction was

measured using nine statements with which respondents agreed on a 6-point Likert scale (1 = strongly agree; 6 = strongly disagree). Three individual cases had invalid response scores, which were imputed using the mean of the remaining response scores. The total possible score ranged from 9 to 54. For both measures, higher scores indicated higher levels of parental self-esteem. Because each measure assesses a unique aspect of parental self-esteem, each component was modeled individually when examining the influence maternal psychosocial characteristics on infant feeding patterns.

Maternal depression risk was assessed using the Center for Epidemiological Studies Depression (CES-D) scale. The scale consists of 20 statements, and respondents indicated how many times per week they experienced the feeling described by each statement. Each response was scored on a scale from zero to three, and four questions were reverse scored (Appendix C). The total possible score ranged from 0 to 60. Scores were dichotomized using the clinical cut point of 16 or higher to identify mothers who expressed depressive symptomology and were at risk for clinical depression (Radloff, 1977). One individual case had a single invalid response score, which was imputed based on the remaining response scores and did not affect the dichotomized score.

### **Household Composition**

The presence of a grandmother in the household was used to assess the impact of household composition. The presence of fathers was not examined because some research has shown that the role of fathers in infant feeding becomes important only in the context of marital unions (Wasser et al., 2013). Grandmothers, however, are often significant features in African-American households with infants and may influence complementary feeding practices (Bentley et al., 1999a; Bentley et al., 1999b; Laraia, Borja and Bentley, 2009; Wasser et al., 2013).

Therefore, the absence or presence of a grandmother in the household was used as a proxy for household composition, and several of the models were stratified using this measure.

### **Covariates**

Covariates included maternal age, maternal education (categorized as less than high school, high school or degree equivalent, some college or program certificate, 4-year degree or higher), and marital status (dichotomized as single or married).

### **Statistical Methods**

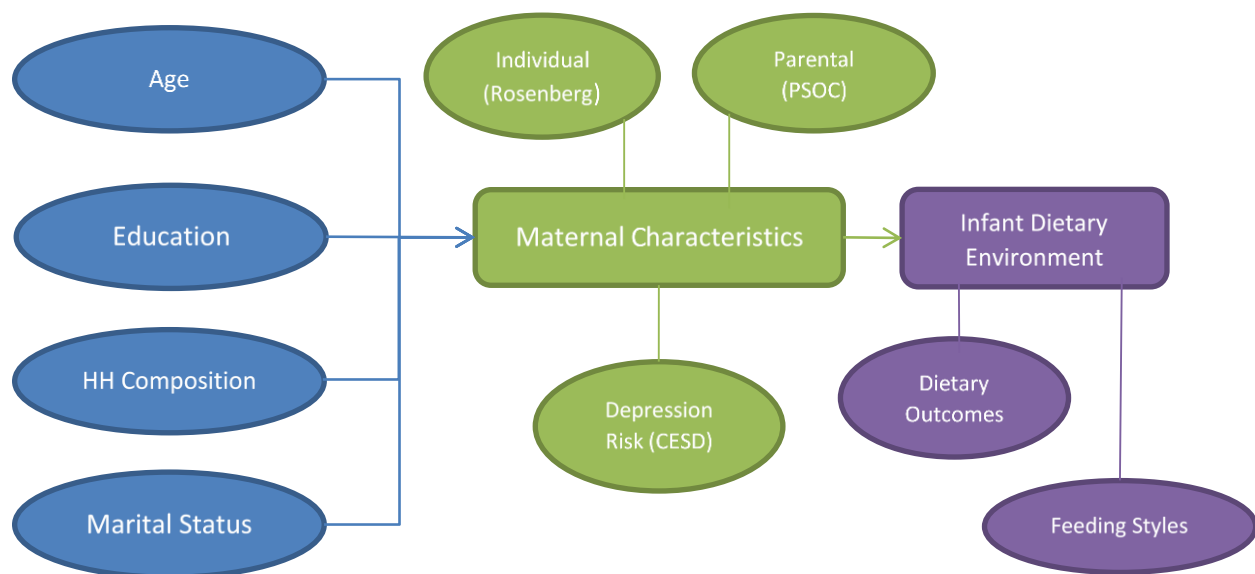
All statistical analyses were conducted in STATA software (version 13.1; STATA Corporation, College Station, TX). Descriptive statistics were run first to compare characteristics across household types. Next, unadjusted bivariate analyses tested the relationship between maternal psychosocial factors and infant feeding style using *t*-tests and linear regression. The linear regression models were then adjusted for maternal age, education, marital status, and household composition, according to the conceptual model for this study (Fig. 1). A combined linear regression model that included all maternal psychosocial factors and covariates was run in order to test how each of the maternal psychosocial factors might affect each other. These separate and combined models were next stratified to determine if the presence of grandmothers in the household influenced mothers' infant feeding styles.

The next set of models evaluated feeding outcomes. Linear regression models tested the unadjusted and adjusted relationships between maternal psychosocial factors and energy consumption from fruits and vegetables, specifically fruit and vegetable servings, total calories and total calories as a percentage of overall daily calories. The associations between maternal psychosocial factors and inappropriate feeding were tested using logistic regression. Unadjusted models were run first, followed by models that adjusted for maternal age, education, marital

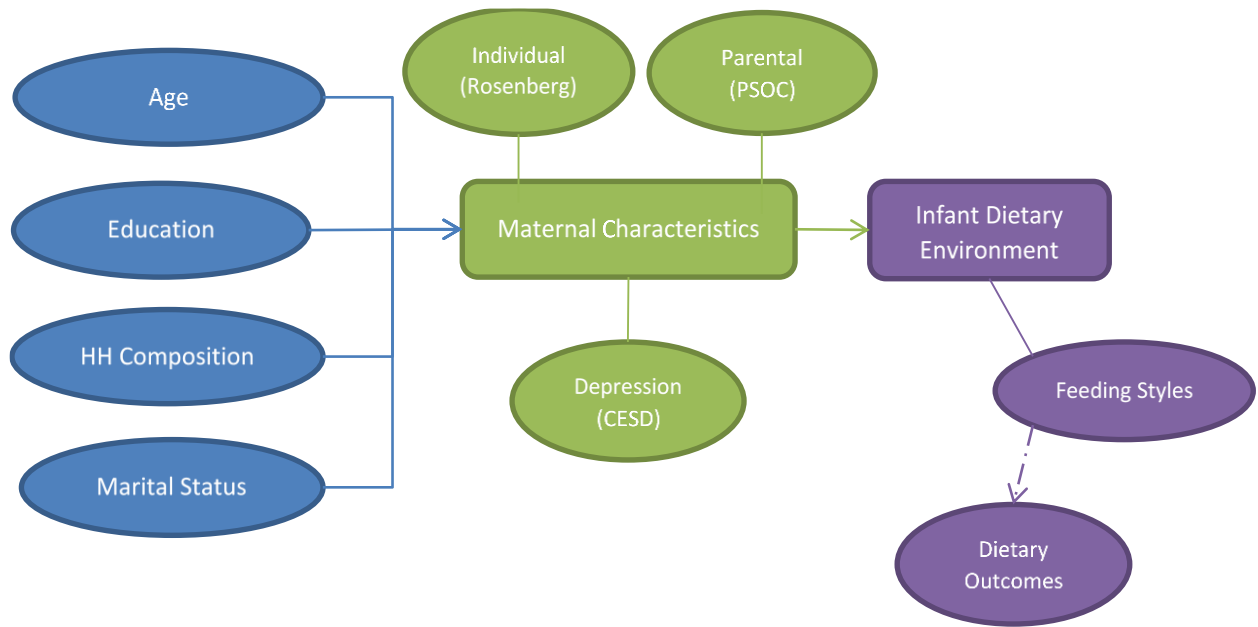


status, and household composition. The original conceptual model was modified to examine if maternal psychosocial factors influenced dietary outcomes through the associated feeding style constructs (Figure 2). The associations between infant feeding style and inappropriate feeding were tested using logistic regression models. Interaction terms were included in the adjusted models to test how inappropriate feeding might be modified by the relationship between infant feeding style and maternal psychosocial factors. Prediction lines were graphed using the interaction margins identified through the adjusted models. Finally, all models were further stratified to test whether or not a grandmother was in the household moderated the effect of maternal psychosocial factors on infant feeding outcomes.

**Fig. 1.** Conceptual model.



**Fig. 2.** Revised conceptual model.



## Qualitative Methods

Interviews from Phase I were analyzed in an effort to contextualize the quantitative findings of this study. Only mothers with infants approximately 9 months of age were included in this subset ( $n = 6$ ) to explore potential influences on the feeding environment during this particular phase of infant development. Interviews were iteratively coded for major themes such as sources of advice and influences on feeding. Representative quotes were chosen to illustrate the salience of each theme.

## CHAPTER 4 – RESULTS

### Sample Descriptives

Select sociodemographics, maternal characteristics, and feeding styles are presented in Table 1. The majority of mothers were unmarried at the time of the study, and nearly one-third lived in a household with the infant's grandmother present. On average, mothers who lived with grandmothers in the household were three years younger ( $p < .001$ ), unmarried ( $p < .01$ ), and had less education ( $p = .03$ ) than mothers who did not. Nearly half of all mothers achieved more than a high school education, and rates were much higher among mothers who did not live with the infant's grandmother in the household. Individual self-esteem (Rosenberg) scores were high, averaging 34.8 on a scale of 40, and were two points higher among mothers who did not live with grandmothers in the household ( $p = .01$ ). Parental self-efficacy (PSOC) scores averaged 38.7 on a scale of 48, and satisfaction (PSOC) scores averaged 38.5 on a scale of 54. Scores did not differ significantly among mothers who did not live with the infant's grandmother in the household. CES-D scores averaged 11.8 out of a possible 60, and nearly one-quarter of mothers were at-risk for clinical depression based on the scale, although the percentage of mothers at-risk for clinical depression was higher among mothers who lived with the infant's grandmother in the household.

Overall, mothers had higher scores for restrictive versus pressuring feeding styles, and there were minimal score variations between mothers who did and mothers who did not live with

*TABLE 1 Descriptive characteristics of participating mothers at the 9 month visit*  
the infant's grandmother in the household. Pressuring with cereal was the only feeding style associated with the presence of a grandmother ( $p < .001$ ).

	Total Sample (9m) ( $n = 160$ )	No Grandmother in HH ( $n = 99$ )	Any Grandmother in HH ( $n = 46$ )
Age (y)	23.31 $\pm$ 3.99	24.39 $\pm$ 4.26	21.55 $\pm$ 2.62 <sup>†</sup>
Education			
< High School	27.39% (43)	21.21% (21)	36.36% (16)*
High School / GED	26.11% (41)	21.21% (21)	31.82% (14)
Some College	35.67% (56)	42.42% (42)	27.27% (12)
$\geq$ College Degree	10.83% (17)	15.15% (15)	4.55% (2)
Not Married	87.50% (140)	34.69% (64)	97.83% (45)**
Any Grandmother in HH	32.19% (47)		
Mom BMI (Final)			
BMI < 18.5	1.25% (2)	1.01% (1)	2.13% (1)
BMI = 18.50-24.99	26.25% (42)	23.23% (23)	29.79% (14)
BMI = 25.00-29.99	28.13% (45)	26.26% (26)	36.17% (17)
BMI = 30+	44.38% (71)	49.49% (49)	31.91% (15)
Self-Esteem (Rosenberg)	34.83 $\pm$ 4.19	35.54 $\pm$ 3.92	33.76 $\pm$ 3.93*
Parental Sense of Competence (PCOS)			
Efficacy	38.66 $\pm$ 4.55	38.89 $\pm$ 4.65	38.74 $\pm$ 4.33
Satisfaction	38.47 $\pm$ 6.91	39.36 $\pm$ 6.81	38.23 $\pm$ 6.09
CES-D Score $\geq$ 16	11.81 $\pm$ 8.86	11.08 $\pm$ 8.05	13.07 $\pm$ 10.27
% At-Risk for Depression	24.53% (39)	23.23% (23)	28.89% (13)
Feeding Style Scores			
Pressure w/ Cereal	2.72 $\pm$ 0.93	2.56 $\pm$ 0.93	3.12 $\pm$ 0.84 <sup>†</sup>
Pressure to Finish	2.56 $\pm$ 0.68	2.56 $\pm$ 0.71	2.55 $\pm$ 0.64
Pressure to Soothe	2.10 $\pm$ 0.85	2.12 $\pm$ 0.83	2.16 $\pm$ 0.93
Pressure Total	2.46 $\pm$ 0.57	2.41 $\pm$ 0.56	2.61 $\pm$ 0.59
Restrict Amount	3.59 $\pm$ 0.93	3.51 $\pm$ 0.95	3.82 $\pm$ 0.81
Restrict Quality	2.64 $\pm$ 0.57	2.64 $\pm$ 0.58	2.57 $\pm$ 0.53
Total restriction	3.11 $\pm$ 0.58	3.07 $\pm$ 0.60	3.19 $\pm$ 0.52

\*  $p < .05$ , \*\*  $p < .01$ , <sup>†</sup>  $p < .001$

## Maternal Self-Esteem, Depressive Symptomology, and Feeding Style

Associations between all maternal psychosocial characteristics and infant feeding styles were analyzed following the original conceptual model (Fig. 1), and only the associations that

TABLE 2 Associations between maternal characteristics and infant feeding styles.

Indicator	Feeding Style	Unadjusted $\beta$ (SE)	Adjusted $\beta$ (SE)
Self-Esteem (Rosenberg)	Pressuring with Cereal	-0.030 (0.018)	-0.015 (0.019)
	Pressuring to Soothe	-0.030 (0.016)	-0.046 (0.019)*
	Total pressuring	-0.018 (0.011)	-0.018 (0.012)
Efficacy (PSOC)	Restriction in Amount	0.022 (0.016)	0.020 (0.017)
	Restriction in Diet Quality	0.025 (0.010)*	0.032 (0.011)**
	Total restriction	0.023 (0.010)*	0.026 (0.011)*
Satisfaction (PSOC)	Pressuring with Cereal	-0.021 (0.011)*	-0.024 (0.011)*
	Pressuring to Finish	-0.013 (0.008)	-0.019 (0.009)*
	Total pressuring	-0.014 (0.007)*	-0.022 (0.007)**
Depressive Symptomology	Pressuring to Soothe	0.357 (0.157)*	0.501 (0.173)**
	Total pressuring	0.181 (0.107)	0.203 (0.113)

\*  $p < 0.05$  \*\*  $p < 0.01$

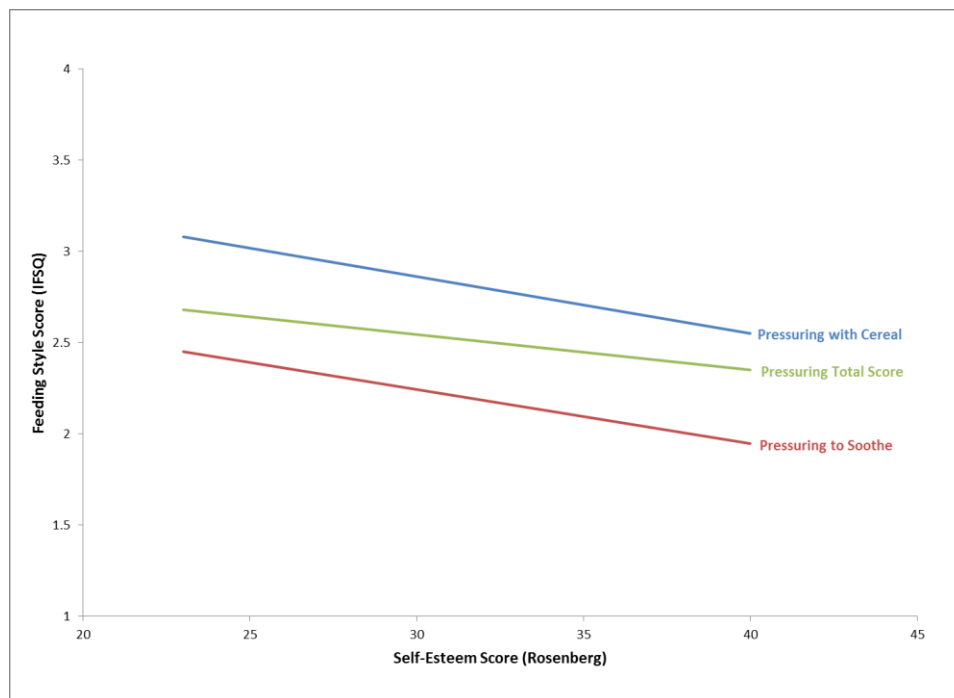
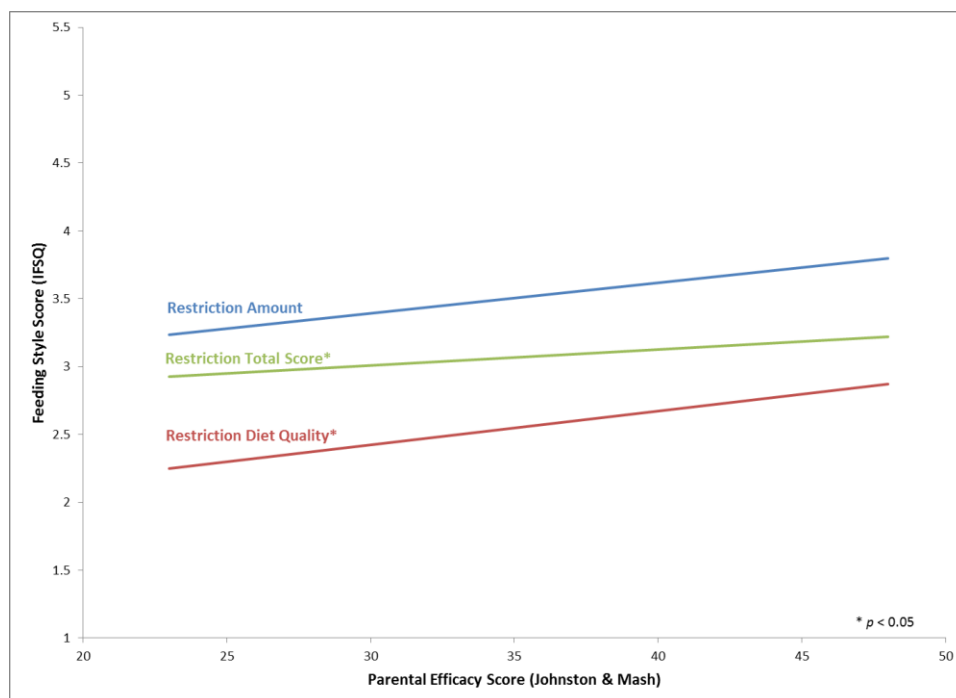


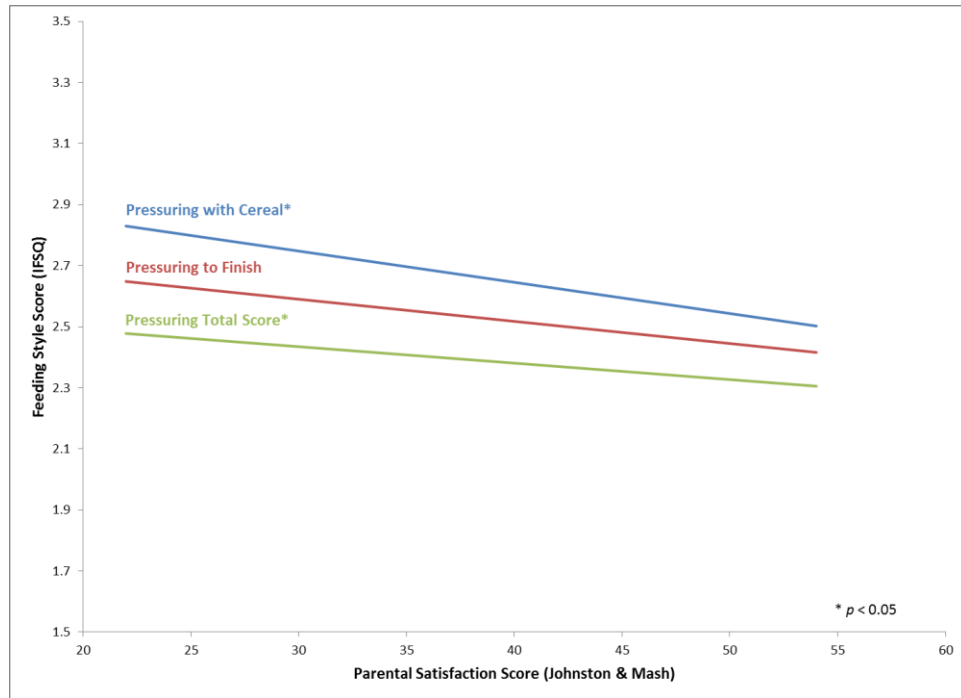
Fig. 3. Mothers' sense of individual self-esteem and associated infant feeding styles.

were found to be moderate-to-significant ( $p < .20$ ) are presented in Table 2. Individual self-esteem, as measured by the Rosenberg Scale, was negatively associated with pressuring with cereal, pressuring to soothe, and total pressuring scores (Fig. 3). The association between self-esteem and pressuring with cereal attenuated when adjusted for maternal age, education, marital status, and household composition. Conversely the association between self-esteem and pressuring to soothe strengthened ( $p = .015$ ), and the association between self-esteem and the total pressuring score remained unchanged. Parental self-efficacy was positively associated with

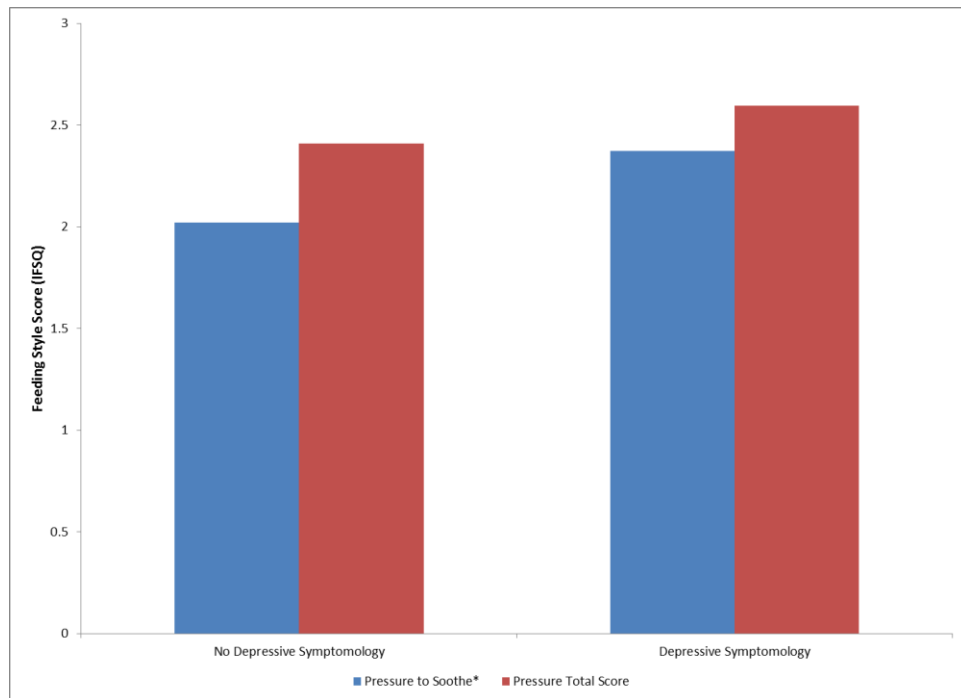


**Fig. 4.** Mothers' sense of parental self-efficacy and associated infant feeding styles.

restrictive feeding styles (Fig. 4), and the associations between self-efficacy and restriction in diet quality ( $p < .01$ ) and the total restriction score ( $p = .02$ ) were significant. Maternal satisfaction was negatively associated with pressuring with cereal ( $p = .03$ ), pressuring to finish ( $p = .03$ ), and total pressuring ( $p < .01$ ) (Fig. 5). Depressive symptomology was positively associated with pressuring to soothe ( $p < .01$ ) and total pressuring (Fig. 6).



**Fig. 5.** Mothers' sense of parental satisfaction and associated infant feeding styles.



**Fig. 6.** Maternal depressive symptomology and associated infant feeding styles.

To test the independent effect of each variable and to see if the different maternal psychosocial measures affected one another, combined adjusted models were run. The associations between maternal characteristics and pressuring feeding styles are presented in Table 3. Model 1 represents a single maternal psychosocial exposure, and Model 2 represents multiple psychosocial exposures. The associations between individual self-esteem (Rosenberg) and pressuring feeding styles were not maintained when all four measures were included, which indicates that other maternal characteristics impacted the associations between individual self-esteem and feeding style. The negative associations between parental satisfaction (PSOC) and pressuring with cereal ( $p = .02$ ), pressuring to finish ( $p < .01$ ) increased significantly, demonstrating that parental satisfaction is a statistically significant, independent predictor of these feeding styles. The association between depressive symptomology and pressuring to soothe attenuated but remained significant ( $p = .03$ ). Although other factors may influence this association, the risk of depression itself is an important predictor of pressuring to soothe.

*TABLE 3 Combined model: maternal characteristics and pressuring feeding style*

Exposure	Pressuring with Cereal		Pressuring to Finish	
	Model 1 $\beta$ (SE)	Model 2 $\beta$ (SE)	Model 1 $\beta$ (SE)	Model 2 $\beta$ (SE)
Self-Esteem (Rosenberg)	-0.015 (0.019)	0.004 (0.023)	0.007 (0.015)	0.023 (0.018)
Self-Efficacy (PSOC)	0.008 (0.016)	0.028 (0.018)	-0.005 (0.013)	0.006 (0.014)
Satisfaction (PSOC)	-0.024 (0.011)	-0.032 (0.014)*	-0.019 (0.009)*	-0.029 (0.011)**
Depressive Symptomology	0.226 (0.177)	0.137 (0.184)	-0.118 (0.139)	-0.164 (0.144)
Exposure	Pressuring to Soothe		Total pressuring	
	Model 1 $\beta$ (SE)	Model 2 $\beta$ (SE)	Model 1 $\beta$ (SE)	Model 2 $\beta$ (SE)
Self-Esteem (Rosenberg)	0.046 (0.019)*	-0.036 (0.022)	0.018 (0.012)	-0.003 (0.014)
Self-Efficacy (PSOC)	0.000 (0.016)	0.023 (0.018)	0.001 (0.010)	0.019 (0.012)
Satisfaction (PSOC)	-0.022 (0.011)*	-0.011 (0.014)	-0.022 (0.007)**	-0.024 (0.009)**
Depressive Symptomology	0.501 (0.173)**	0.386 (0.180)*	0.203 (0.113)	0.120 (0.116)

\*  $p < 0.05$     \*\*  $p < 0.01$

Model 1: adjusted for age, education, marital status, grandmother in household; single exposure

Model 2: adjusted for age, education, marital status, grandmother in household; multiple exposures



The associations between maternal characteristics and restrictive feeding styles identified through the combined models are presented in Table 4. The significant associations between parental self-efficacy and restriction feeding styles were maintained. Parental self-efficacy was positively associated with restriction of amount, restriction of diet quality ( $p < .01$ ), and total restriction ( $p = .02$ ), indicating that parental self-efficacy is a statistically significant, independent predictor of these two feeding styles.

*TABLE 4. Combined model: maternal characteristics and restrictive feeding style associations*

Exposure	Restriction of Amount	
	Model 1 $\beta$ (SE)	Model 2 $\beta$ (SE)
Self-Esteem (Rosenberg)	0.019 (0.020)	0.018 (0.024)
Self-Efficacy (PSOC)	0.020 (0.017)	0.025 (0.019)
Satisfaction (PSOC)	-0.004 (0.012)	-0.019 (0.015)
Depressive Symptomology	-0.191 (0.186)	-0.198 (0.195)
Exposure	Restriction of Diet Quality	
	Model 1 $\beta$ (SE)	Model 2 $\beta$ (SE)
Self-Esteem (Rosenberg)	0.008 (0.013)	-0.011 (0.015)
Self-Efficacy (PSOC)	0.032 (0.011)**	0.035 (0.012)**
Satisfaction (PSOC)	0.009 (0.008)	-0.000 (0.009)
Depressive Symptomology	-0.086 (0.120)	-0.087 (0.123)
Exposure	Total restriction	
	Model 1 $\beta$ (SE)	Model 2 $\beta$ (SE)
Self-Esteem (Rosenberg)	0.013 (0.013)	0.003 (0.016)
Self-Efficacy (PSOC)	0.026 (0.011)*	0.030 (0.012)*
Satisfaction (PSOC)	0.002 (0.008)	-0.010 (0.009)
Depressive Symptomology	-0.134 (0.121)	-0.139 (0.125)

\*  $p < 0.05$     \*\*  $p < 0.01$

Model 1: adjusted for age, education, marital status, grandmother in household; single exposure

Model 2: adjusted for age, education, marital status, grandmother in household; multiple exposures

## Maternal Self-Esteem, Depressive Symptomology, and Dietary Outcomes

Direct associations between maternal characteristics and dietary outcomes were not in and of themselves significant, so the conceptual model was revised to investigate the relationships vis-à-vis their associations with feeding styles (Fig. 2). Results of caloric intake analysis confirmed previous findings (see: Thompson, Adair, and Bentley 2013): higher pressuring with cereal scores were associated with higher energy intake overall, and higher restriction in quality scores were associated with lower energy intake (results not shown). Maternal psychosocial factors did not significantly influence the effect size or significance of the associations between feeding styles and energy intake with one exception: when controlling for parental satisfaction, the mean percentage of overall daily calories from fruits and vegetables increased as the pressuring to finish score increased ( $p < .01$ ) (Table 5).

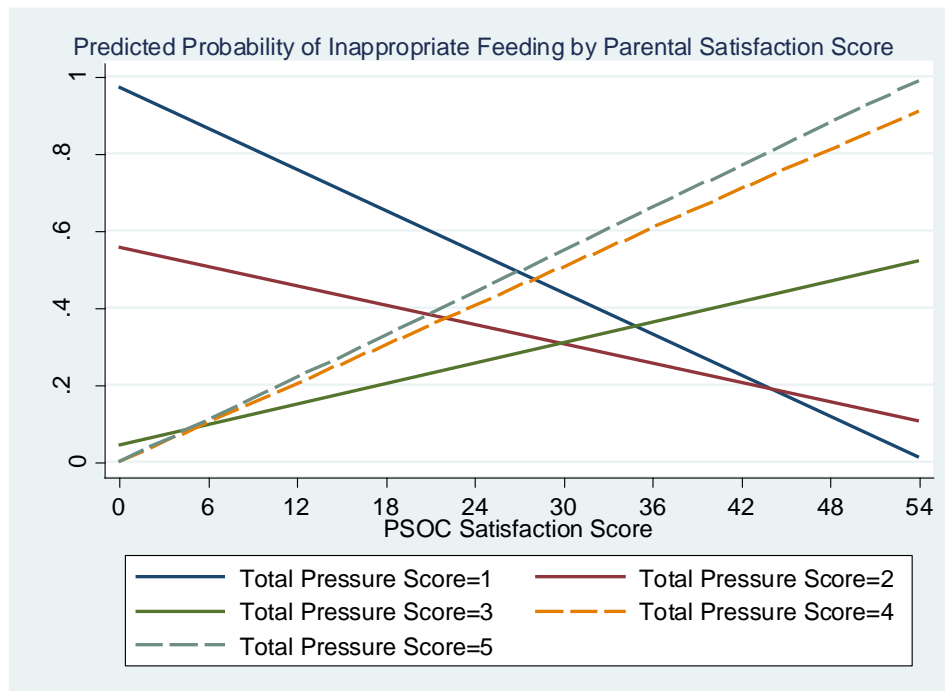
TABLE 5. *Adjusted associations between pressuring to finish and nutritional outcomes when controlling for maternal satisfaction*

Nutritional Outcome	$\beta$ (SE)
Number of Fruit and Vegetable Servings	0.379 (0.113)**
Fruit and Vegetable Total Calories [kcal]	31.251 (10.352)**
Fruit and Vegetables as % of Total Calories	0.038 (0.013)**
Mean Total Calories [kcal] per Day	30.475 (34.019)

\*  $p < 0.05$     \*\*  $p < 0.01$

The feeding outcome models tested if infant feeding styles modified the relationship between maternal psychosocial characteristics and inappropriate feeding using logistic regression models that included interaction terms. Prediction lines were graphed to depict the interactions between maternal characteristics and feeding styles on the odds of the inappropriate feeding of specific types of foods as well as inappropriate feeding overall. The only significant interaction identified was that between maternal satisfaction and the total pressuring score on the odds of

any inappropriate feeding (Fig. 7). As satisfaction and total pressuring scores increased, the likelihood of inappropriate feeding increased (OR = 1.11, 95% CI [1.00, 1.23]).



**Fig. 7.** Interactions between maternal satisfaction and total pressuring score for inappropriate feeding.

### Influence of Household Composition on Feeding Styles

To ascertain if household composition influenced feeding styles, the results for associations between maternal psychosocial characteristics and infant feeding style outcomes were stratified by whether or not the infant's grandmother was in the household; results are presented in Table 6. The adjusted model did not include marital status because of collinearity between marital status and the presence of a grandmother. When stratified by household composition, the negative association between individual self-esteem (Rosenberg) and pressuring with cereal became positive. The effect size of the negative association with pressuring to soothe increased, while it decreased for the negative association with the total pressuring score. However, none of the associations were statistically significant.

TABLE 6. Stratified associations between maternal characteristics and infant feeding styles

Indicator	Feeding Style	No Grandmother	Grandmother Present
		$\beta$ (SE)	$\beta$ (SE)
Self-Esteem (Rosenberg)	Pressuring with Cereal	-0.038 (0.024)	0.014 (0.033)
	Pressuring to Soothe	-0.030 (0.022)	-0.071 (0.036)
	Total pressuring	-0.025 (0.015)	-0.003 (0.024)
Efficacy (PSOC)	Restriction in Amount	0.013 (0.022)	0.034 (0.030)
	Restriction in Diet Quality	0.040 (0.012)**	-0.009 (0.017)
	Total restriction	0.026 (0.014)	0.013 (0.018)
Satisfaction (PSOC)	Pressuring with Cereal	-0.037 (0.013)**	-0.012 (0.020)
	Pressuring to Finish	-0.026 (0.010)*	0.001 (0.015)
	Total pressuring	-0.024 (0.008)**	-0.023 (0.014)
Depressive Symptomology	Pressuring to Soothe	0.297 (0.200)	0.994 (0.350)**
	Total pressuring	0.124 (0.134)	0.002 (0.008)

\*  $p < 0.05$     \*\*  $p < 0.01$

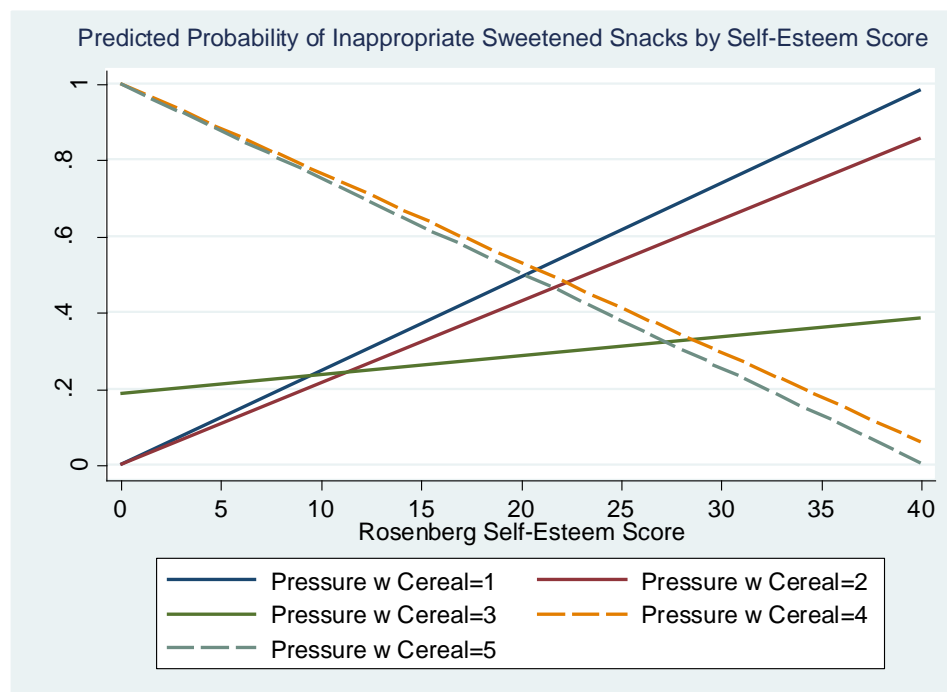
The absence or presence of a grandmother dramatically affected the associations between maternal self-efficacy and infant feeding style. The association with restriction in amount weakened slightly when a grandmother was not present in the household, while the association remained constant for total restriction and strengthened for restriction in diet quality ( $p < .01$ ). When a grandmother was present, the association between self-efficacy and restriction in amount strengthened, whereas it weakened for total restriction and reversed for restriction in diet quality.

When the associations between parental satisfaction and infant feeding style were stratified, the negative associations with pressuring with cereal ( $p < .01$ ), pressuring to finish ( $p = .01$ ), and total pressuring ( $p < .01$ ) all strengthened when a grandmother was not present in the household. When a grandmother was present, the association with total pressuring remained constant although was not significant. The association with pressuring with cereal weakened and reversed for pressuring to finish.

The associations between depressive symptomology and pressuring to soothe and the total pressuring scores weakened when a grandmother was not present in the household. When a grandmother was present, the association between depressive symptomology and pressuring to soothe strengthened significantly ( $p < .01$ ) and weakened dramatically for total pressuring.

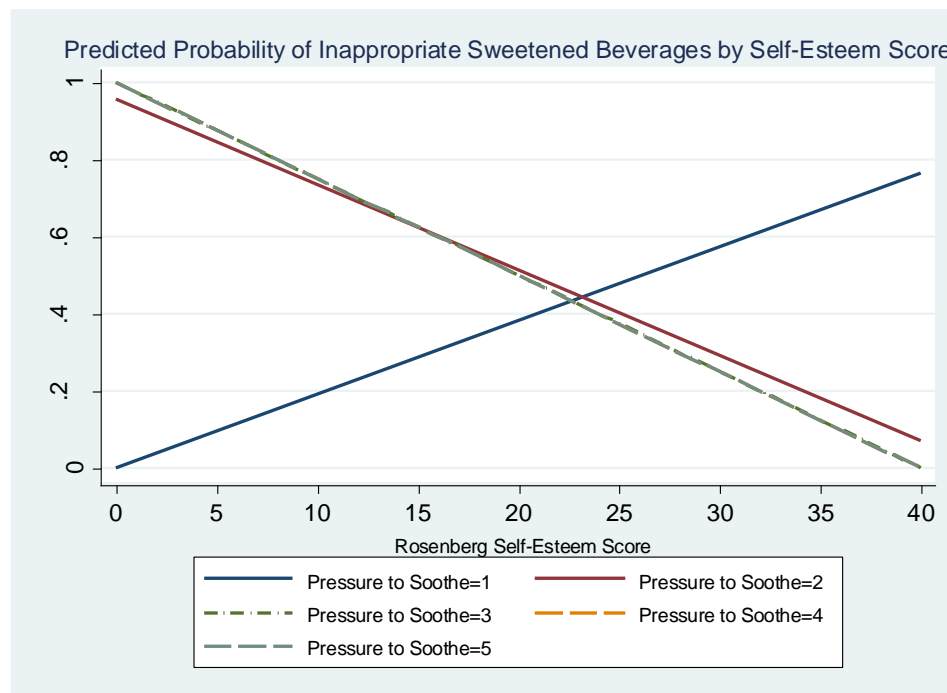
### **Influence of Household Composition on Inappropriate Feeding**

The influence of household composition on caloric intake and inappropriate feeding was not significantly different from what was identified in the non-stratified analysis; the presence of grandmothers was not associated with dietary outcomes. The interaction models that assessed the influence of maternal psychosocial factors and feeding styles on inappropriate feeding were stratified according to whether or not a grandmother was present in the household in order to test if grandmothers' presence influenced infants' mothers.



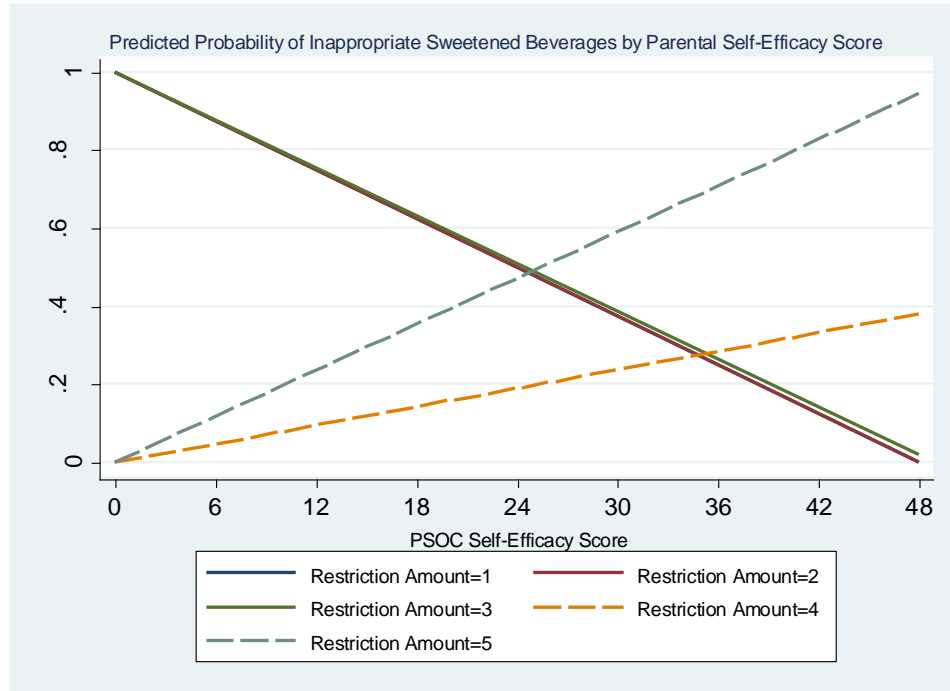
**Fig. 8.** Interactions between individual self-esteem and pressuring with cereal for inappropriate sweetened snacks when a grandmother is present.

First stratified interactions between individual self-esteem and infant feeding style were reviewed. When a grandmother was present in the household, the probability of feeding inappropriate sweetened snacks decreased as self-esteem and pressuring with cereal scores increased (OR = 0.66, 95% CI [0.44, 0.98]) (Fig. 8). Similarly, the probability of giving an infant sweetened beverages decreased as self-esteem and pressuring to soothe scores increased (OR = 0.68, 95% CI [0.47, 0.99]) (Fig. 9).

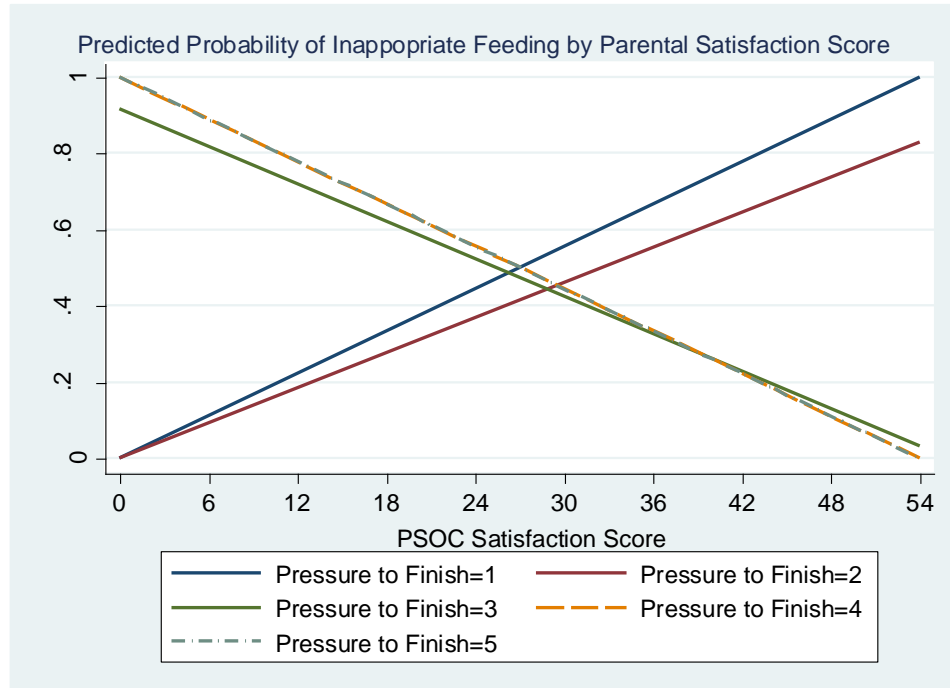


**Fig. 9.** Interactions between individual self-esteem and pressuring to soothe for inappropriate sweetened beverages when a grandmother is present.

Next, when looking at the interactions between maternal self-efficacy and infant feeding styles, the only significant interaction found was that between self-efficacy and restriction in amount. When a grandmother was present in the household, the probability of giving an infant sweetened beverages actually increased as self-efficacy and restriction in amount of food scores increased (OR = 1.51, 95% CI [1.07, 2.13]) (Fig. 10).

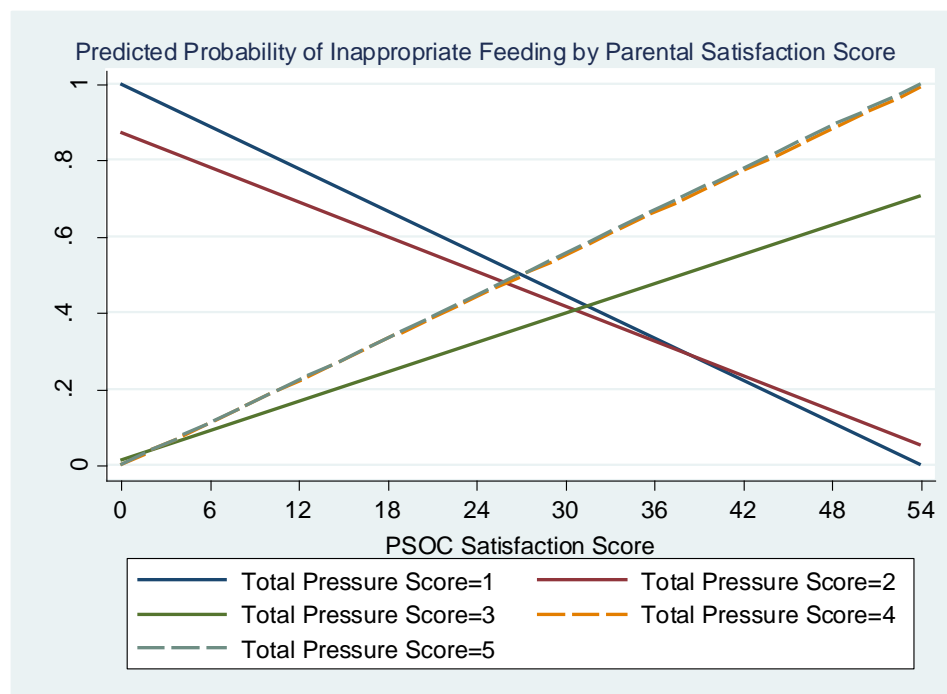


**Fig. 10.** Interactions between self-efficacy and restriction amount for inappropriate sweetened beverages when a grandmother is present.



**Fig. 11.** Interactions between parental satisfaction and pressuring to finish for inappropriate feeding when a grandmother is present.

Two inappropriate feeding outcomes were found to be associated with interactions between maternal satisfaction and pressuring feeding styles. First, when a grandmother was present in the household, the probability of any inappropriate feeding decreased as maternal satisfaction and pressuring to finish scores increased (OR = 0.73, 95% CI [0.56, 0.96]) (Fig. 11). This contrasted with the next finding: when a grandmother was not present in the household, the probability of any inappropriate feeding actually increased as maternal satisfaction and total pressuring scores increased (OR = 1.20, 95% CI [1.03, 1.41]) (Fig. 12).



**Fig. 12.** Interactions between parental satisfaction and total pressuring score for inappropriate feeding when a grandmother is not present.

Finally, no inappropriate feeding outcomes were significantly associated with the interactions between depressive symptomology and infant feeding styles in the stratified models.

### Ethnographic Interviews

Two significant themes emerged through analysis of the ethnographic interviews: grandmothers as advisors and the importance of modeling behaviors. First, infants' grandmothers were identified as salient feeding and nutrition advisors in all six mothers' lives. Three mothers



indicated that the infants' grandmothers proactively offered advice. One mother indicated that she spent a lot of time with her own mother and stated, "She told me, 'Don't start him on fruits. Don't give him anything with the sweet. Start him on vegetables first.' So that's what I did." Four mothers indicated they actively sought advice from infants' grandmothers. One mother stated, "I'm always listening to my mama. I call her all the time." Two mothers indicated that advice from infants' grandmothers is weighted more heavily than advice from anyone else because they valued grandmothers' own experience rearing children. When asked whose advice she would follow were there a discrepancy, one mother indicated, "I'd go with my mom is who I'd go. Unless it was my grandmother or somebody like that, more wiser. But I'd probably take my mama's—so and so said that "you should do like this." If she says they're wrong, then they're wrong." Another was even up front with her physician about her reliance on her own mother's advice, "Because she's my mama and with all the grandchildren and her own children, I just feel like she's knowledgeable—I think we came out pretty good, so what she tells me is usually what I go by. And I'll tell the doctor, 'Well my mama said...'"

Second, when it comes to feeding complementary foods, modeling emerged as an important strategy. Two mothers felt that their own habits influenced what their children eat, and all mothers indicated that their own childhood—how they were raised by their mothers— influenced how and what they fed their children. As one mother remarked about her children's diets in relation to hers growing up, "it's like a family thing." Another mother elaborated, "I think it sticks with you. You know, how you were raised or how you grew up." When asked if her own childhood influenced how she feeds her children, yet another mother stated, "Yeah, I think so 'cause we were so close, you know. So I kinda want that same thing going on."

## **CHAPTER 5 – DISCUSSION**

### **Maternal Psychosocial Characteristics and the Infant Dietary Environment**

Overall, parental self-esteem and depressive symptomology were found to influence infant feeding style outcomes. The associations between parental self-esteem, specifically maternal satisfaction followed by maternal self-efficacy, are more significantly associated with infant feeding style outcomes than other maternal psychosocial characteristics, which indicates that it may be important for infant development to help mothers feel content and confident in their roles specifically as parents. Individual self-esteem was not significantly associated with infant feeding style when other maternal psychosocial characteristics were considered.

This study found that maternal self-efficacy was positively associated with restrictive feeding styles, which contrasts with other findings. Mitchell's et al. (2009) study among Australian mothers and their preschool-aged children found that both parental efficacy and satisfaction were negatively correlated with restrictive feeding styles. Although differences in children's age in each study may be one factor, there may be other factors—such as cultural practices, socioeconomic status, or other unmeasured observable traits—that explain the differences in findings between African-American mothers and infants in this study and the predominantly Australian participants in Mitchell's et al. research (Dettwyler, 1989; Perrin et al., 2014). More research is needed to investigate what those factors or traits may be.

Results show that maternal satisfaction was negatively associated with pressuring feeding styles, which confirms what Mitchell et al. (2009) found in their study. The mechanisms through which this association is created are not clear. A study in southern Israel found that, among

parents with toddlers of normal developmental trajectories, children's temperament was positively correlated with maternal sense of competence and negatively correlated with parental control during feeding interactions (Aviram et al., 2015). It's possible that either parents with higher satisfaction perceive more positive infant temperaments, or parents with more positive infants have higher parental satisfaction, and therefore exert less pressuring control in feeding interactions. Few studies have examined how parenting self-esteem relates to infant and child feeding styles, so more research is needed to understand this relationship, especially in terms of the infant's own characteristics and mother-infant interactions during feeding.

Depressive symptomology was significantly associated with the pressuring to soothe feeding style. This finding is consonant with other research that has found positive associations between maternal depressive symptomology and forceful or controlling feeding in older children (Farrow and Blissett, 2005; Hurley et al., 2008), specifically with pressuring feeding styles (Francis, Hofer and Birch, 2001; Gemmill, 2013; Goulding, 2014; Haycraft, Farrow and Blissett, 2013). Some researchers have suggested possible associations between maternal depression and infant temperament (Hurley et al., 2008), and others have found that mothers who are higher emotional eaters reported higher emotional feeding scores (Wardle et al., 2002). It's possible that mothers who exhibit depressive symptomology eat more themselves when distressed, and when they perceive their babies are fussy they may be more likely to pressure with food in order to calm their infants.

Dietary outcomes were largely unaffected by maternal psychosocial characteristics. The only exception was the association between fruit and vegetable intake and pressuring scores when adjusted for maternal satisfaction. As pressuring to finish scores increased, so did the mean fruit and vegetable intake as a percentage of total daily calories. As Thompson, Adair, and

Bentley (2013) found, pressuring scores were related to higher energy intake overall. This study demonstrates that, when parental satisfaction is considered, the pressuring construct does result in higher net intake of “healthy” fruits and vegetables. However, when the interaction terms are considered, the likelihood of inappropriate feeding also increased as parental satisfaction and pressuring scores increased. It is unknown if feeding inappropriate foods occurred as a reward for finishing healthier foods (Dettwyler, 1989), or if other processes are operating toward this end. More research is needed to understand the interacting dynamics among these variables.

### **Household Composition**

The only maternal feeding style directly associated with the presence of a grandmother was pressuring with cereal, which is unsurprising given that reliance on maternal grandmothers for advice has been associated with the early introduction of cereal in the bottle among infants (Bentley et al 1999; McLorg & Bryant 1989). When examined separately from maternal psychosocial exposures and feeding styles, the mere presence of grandmothers in the household did not have an impact on energy intake, the consumption of fruits and vegetables, or inappropriate feeding among 9-month-old infants.

The associations between maternal psychosocial characteristics and feeding styles were stratified by whether or not a grandmother was present in the house, and the results confirmed that parental self-esteem, followed by depressive symptomology, was significantly associated with infant feeding style outcomes. Individual self-esteem was not a predictor of infant feeding style in the stratified models. Notably, maternal self-efficacy and satisfaction were significant only when a grandmother was not present in the household. The presence of a grandmother generally attenuated or even reversed the association between parental self-esteem and infant

feeding style. The only exception was that the association between parental self-efficacy and restriction in amount of food strengthened, but it was not statistically significant.

The presence of a grandmother may influence how mothers fulfill their roles as parents. A study among adolescent mothers in Washington found that adolescent mothers living with grandmothers were more likely to continue in their adolescent roles; grandmothers were more likely to treat mothers as teenagers rather than facilitate the transition into their new roles as parents (Spieker and Bensley, 1994). Similarly, a study of low-income, teenaged African-American mothers in Baltimore found that grandmothers who had extended access to infants frequently played the dominant role in determining the infant's diet; young mothers' dependence on their own mothers often resulted in deferment of infant dietary decisions (Bentley et al., 1999b). It is possible that similar mechanisms operated among the mothers who participated in this study. Because mothers who lived in households with grandmothers were younger and less educated, they may have been more likely to rely on grandmothers for support regarding feeding decisions. As the ethnographic interviews demonstrate, mothers frequently model grandmothers in caring for their children. The modeling effect may be stronger when mothers and grandmothers are in more frequent and prolonged contact, such as when they cohabitate. More research is needed to illuminate the pathways through which these familial relationships inside the household affect mothers' psychosocial experiences and decision making.

The interactions between maternal psychosocial characteristics and infant feeding styles add another dimension to this question about how grandmothers influence infant feeding. In several instances, the presence of grandmothers was actually protective of inappropriate feeding. Even as controlling feeding styles increased with the intensity of self-esteem, efficacy, or satisfaction, the likelihood of inappropriate feeding actually decreased in the presence of a

grandmother. Only as parental satisfaction and total pressuring scores increased did the likelihood of any inappropriate feeding also increase when a grandmother was present. These findings contrast those of several studies that have found associations between the reliance on grandmothers for advice and inappropriate feeding of younger infants, namely by putting cereal in the bottle (Baughcum et al., 1998; Bentley et al., 1999b; McLorg and Bryant, 1989).

There are many mechanisms that could help to explain these findings. Research among families with older children has shown that parents and grandparents often are knowledgeable about the kinds of diets that are healthy for children, and constraints such as time, money and difficult interactions influence what ultimately ends up on the table (Brewis and Gartin, 2006; Kaplan, Kiernan and James, 2006). One study in Maryland (Speirs et al., 2009) found that grandmothers who cared for their grandchildren often bought and prepared much of what the children ate and, importantly, had a monthly income significantly higher than mothers did. It is possible that additional economic resources in the household enable the provisioning of healthier foods in lieu of foods that are inappropriate for infants. Furthermore, this may be an example of grandmothers' influence operating through mothers' modeling of feeding and dietary behaviors, a notion that was supported by the ethnographic interviews.

## **Limitations**

Because this study examined a cross-sectional sample of mothers with infants approximately 9 months old, the results reflect only a snapshot of what occurs throughout the course of infant development. They do not address changes over time that may occur as a consequence of changes in the mothers' psychosocial characteristics, infants' temperament, or situations such as household composition.

This analysis did not examine mothers' perceptions of their infant or infants themselves as mediators of feeding styles and dietary outcomes. Other studies have demonstrated that infant and child temperament (Hodges et al., 2008; Stifter et al., 2011; Wasser et al., 2011), gender (Sacco et al., 2007), and size (Farrow and Blissett, 2008; Francis, Hofer and Birch, 2001; Ogden, Reynolds and Smith, 2006; Thompson, Adair and Bentley, 2013) influence feeding outcomes. This is an important consideration within the ecocultural model, which identifies the infant as an agent who helps to shape the developmental environment (Worthman, 2010a). Therefore, it will be important for future research to consider the role of the infant in determining these feeding processes and outcomes.

There are also questions of data collection to consider. Although diet histories were self-reported and may be subject to recall bias, the information was collected by reviewers trained in multi-pass procedures, a method that elicits eating patterns consistent with those obtained through weighed food records (Fisher et al., 2008). Additionally, despite the fact that all of the data were drawn from sources within the same population, the qualitative and quantitative data were drawn from different individual sources. It is possible that the modeling reported by some mothers did not match the individual experiences of mothers who provided the infant feeding style and dietary outcome data. However, given that the mothers in Phase II of the study were first time mothers, whereas many of the mothers in Phase I had multiple children, one might expect them to rely more heavily on their own mothers as examples for parenting.

Despite these limitations, this study does have its strengths. Self-esteem, self-efficacy and depression symptom questionnaires were administered at each interview throughout the project, so the scores reflect each mother's state at the time of the interview. As some research shows, the timing of depressive symptomology may be more important than simply the mere fact of it

(Wang et al 2013). Identifying the associations among maternal psychosocial characteristics, infant feeding patterns, and dietary outcomes is a step toward understanding the mechanisms through which caretaker psychology influences child development and the risk of obesity.



## **CHAPTER 6 – CONCLUSION**

An ecocultural theoretical framework considers the influence of children's physical and social settings, local child rearing customs, and caretaker psychology on the development of children. This study examined two components: maternal psychology and household composition. Among African American mothers in Central North Carolina, maternal satisfaction, self-efficacy and depressive symptomology influenced feeding style outcomes. The presence of a grandmother in the household also contributed to the creation of the child dietary environment. The presence of grandmothers was associated, in many cases, with a decreased likelihood of feeding 9-month-old infants foods that are inappropriate for their age.

These findings have implications both for future research and intervention. It is clear that more research is needed to understand how the role of maternal self-efficacy and satisfaction influence infant growth and obesity risk. This focus could shape the design of future interventions that emphasize the development of parenting skills or support networks available to new mothers. Greater understanding of the roles of grandmothers and other caretakers in the household, as well as the processes through which they influence mothers in the creation of the child dietary environment, may inform the development of social policies, such as those that provide access to supplemental nutrition benefits. Therefore, more research is warranted to assess these household roles and identify the mechanisms through which they operate.

## **APPENDIX A – ROSENBERG SELF-ESTEEM SCALE**

- \*1. On the whole, I am satisfied with myself.
- 2. At times I think I am no good at all.
- \*3. I feel that I have a number of good qualities.
- \*4. I am able to do things as well as most other people.
- 5. I feel I do not have much to be proud of.
- 6. I certainly feel useless at times.
- \*7. I feel that I'm a person of worth, at least on an equal plane with others.
- 8. I wish I could have more respect for myself.
- 9. All in all, I am inclined to feel that I am a failure.
- \*10. I take a positive attitude toward myself.

Scoring:

1 = Strongly Agree

2 = Agree

3 = Disagree

4 = Strongly Disagree

\* indicates questions that were reverse scored.

## APPENDIX B – PARENTAL SENSE OF COMPETENCY SCALE

<u>Question</u>	<u>Parental Self-Efficacy*</u>	<u>Parental Satisfaction</u>
1. I think I do a good job caring for my child.	X	
2. If anyone can find the answer to what is troubling my child, it's me.	X	
3. The problems of taking care of a child are easy to solve.	X	
4. Even though being a parent could be rewarding, it is difficult now.		X
5. I go to bed feeling like I have not done a whole lot.		X
6. Sometimes when I'm supposed to be the one in control, I feel like the one being controlled.		X
7. My mother was better prepared to be a good mother than I am.		X
8. I would make a fine model for a new mother.	X	
9. Any problems of being a parent are easily solved.	X	
10. A problem in being a parent is not knowing whether you're doing a good job or a bad one.		X
11. Sometimes I feel like I'm not getting anything done.		X
12. I am more interested in other things than being a parent.		X
13. Considering how long I've been a mother, I know what I'm doing.	X	
14. I would be a better mother if it were more interesting.		X
15. I have all the skills to be a good mother.	X	
16. Being a parent makes me tense and nervous.		X
17. Being a good mother is rewarding.	X	

Scoring:

1 = Strongly Agree

2 = Agree

3 = Somewhat Agree

4 = Somewhat Disagree

5 = Disagree

6 = Strongly Disagree

\* indicates questions were reverse scored.

## **APPENDIX C – CENTER FOR EPIDEMIOLOGIC STUDIES DEPRESSION SCALE**

In the past week:

1. I was bothered by things that don't usually bother me.
2. I did not feel like eating; my appetite was poor.
3. I felt that I could not shake off the blues even with help from my family or friends.
- \*4. I felt I was just as good as other people.
5. I had trouble keeping my mind on what I was doing.
6. I felt depressed.
7. I felt that everything I did was an effort.
- \*8. I felt hopeful about the future.
9. I thought my life had been a failure.
10. I felt fearful.
11. My sleep was restless.
- \*12. I was happy.
13. I talked less than usual.
14. I felt lonely.
15. People were unfriendly.
- \*16. I enjoyed life.
17. I had crying spells.
18. I felt sad.
19. I felt that people disliked me.
20. I could not get 'going.'

Scoring:

- 0 = Rarely or none of the time (< 1 day)  
1 = Some or a little of the time (1-2 days)  
2 = Occasionally or a moderate amount of time (3-4 days)  
3 = Most or all of the time (5-7 days)  
\* indicates questions that were reverse scored.

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