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FACTORS CONTRIBUTING TO INFANT FEEDING PRACTICES WITH LATINA
MOTHERS

A dissertation submitted in partial fulfillment of the requirements for the degree of Doctor of
Philosophy at Virginia Commonwealth University.

by

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Abstract

FACTORS CONTRIBUTING TO INFANT FEEDING PRACTICES WITH LATINA MOTHERS

By Diana Cristina Cartagena, RN, CPNP

A dissertation submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy at Virginia Commonwealth University.

Virginia Commonwealth University, 2014

Major Director: Suzanne Ameringer, PhD, RN
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Background: An estimated 9.7% of U.S. infants and toddlers are considered overweight.

Hispanic infants persistently show higher prevalence rates for being overweight compared to black and white infants. Little is known about factors promoting excessive infant weight gain in Latinos.

Purpose: Primary aim of this study was to describe multidimensional factors and maternal feeding practices that may correlate with infant overfeeding in Latina mothers. A secondary aim was to determine whether there was an association between these factors and infant weight gain.

Subjects: Sixty-two low-income immigrant Latina mothers and their infants ages 4-12 months receiving assistance through the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC).

Design: A descriptive correlation cross-sectional study.

Methods: A native Spanish-speaking investigator who guided the participants through the options administered all the measures. Measures included: acculturation indicators; maternal feeding beliefs; maternal feeding practices; maternal knowledge and self-efficacy; food availability/insecurity indicators; infant's temperament; infant's 24-hour dietary recall; and infant's height and weight measures. Univariate and multiple linear regressions were used to examine relationships.

Results: Over 25% of infants were at >85th percentile for weight-for-length, and 21% were at \geq 98th percentile. Among infants at the >85th percentile for weight-for-length, 27% of the mothers wished their infants were heavier. Three-quarters of the participants were not currently breastfeeding their infants (74.2%). Healthier maternal feeding practices were inversely correlated with maternal age and the number of people living at home. Multiple regression results showed infant's age and maternal education as significant positive predictors of less controlling maternal feeding practices. None of the analyzed factors were significant predictors of infant's weight gain.

Conclusion: Future research is needed to further delineate the primary driving forces behind immigrant Latina mothers' feeding decisions and practices. Given the protective benefit of breastfeeding in reducing the risk of early childhood and adult obesity, present intervention efforts should focus primarily on the promotion of healthy feeding practices that encourage and support exclusive breastfeeding among this ethnic group.

Keywords: infant feeding, feeding practices, overfeeding, Hispanic, Latina mother,
Hispanic mother.

Chapter 1-- Introduction

Childhood obesity remains one of the major public health concerns in the United States. An estimated 9.7% of U.S. infants and toddlers are considered overweight (Ogden, Carroll, Kit, & Flegal, 2012). Latino infants are predominately more obese compared to infants from other ethnic and racial groups (Ogden et al., 2012). Little is known about factors promoting excessive infant weight gain in Latinos. Mothers play a vital role on the way infants learn and experience food and the eating habits they develop (Anzman, Rollins, & Birch, 2010). A better understanding of the factors that contribute to infant feeding practices in Latina mothers may help explain the overweight rates often seen among this ethnic group.

Studies of Latina mothers indicate that their feeding beliefs and practices are likely to promote infant overfeeding. Research on breastfeeding and formula feeding beliefs, attitudes, and practices of Latinas point out some of the factors leading to infant feeding differences among these mothers. Latina mothers are more likely to initiate breastfeeding but less likely to practice exclusive breastfeeding than white or black mothers (Centers for Disease Control (CDC), 2013). Cultural traditions and influence from family members may contribute unnecessary supplementation with formula and other unhealthy feeding practices, such as early introduction of solids and ethnic foods (Bunik et al., 2006). Another factor contributing to feeding differences among Latinas is a common cultural belief that a heavy baby is a healthy baby (Bunik et al., 2006; Higgins, 2000; Kaufman & Karpati, 2007). In general, the feeding practices and beliefs of

Latina mothers are embedded in cultural views of what constitutes healthy infant feeding practices and weight gain.

Maternal overfeeding practices appear to be linked to the higher obesity rates observed in Latino infants. The purpose of the present study was to describe maternal, infant, and food factors contributing to infant feeding practices of Latina mothers using an Ecological Model of Growth. In addition, the association between maternal, infant, and food factors, and maternal feeding practices as well as infant weight gain was evaluated.

Study results showed that over 25% of infants were at $>85^{\text{th}}$ percentile for weight-for-length, and 21% were at $\geq 98^{\text{th}}$ percentile. Among infants at the $>85^{\text{th}}$ percentile for weight-for-length, 27% of the mothers wished their infants were heavier. Three-quarters of the participants were not currently breastfeeding their infants (74.2%). Healthier maternal feeding practices were inversely correlated with maternal age and the number of people living at home. Multiple regression results showed infant's age and maternal education as significant positive predictors of less controlling maternal feeding practices. None of the analyzed factors were significant predictors of infant's weight gain.

Obesity in infants and young children results from maternal feeding practices and home environments that foster unhealthy eating behaviors. Future studies should explore interventions primarily aimed at promoting healthy feeding practices that encourage and support exclusive breastfeeding among this ethnic group. Empirical studies should further explore the influence of socioeconomic factors such as formula incentives on breastfeeding practices of low-income immigrant mothers. Additional research is also needed for the development and testing of

culturally sensitive instruments to evaluate maternal health beliefs related to infant feeding and guide targeted interventions that are meaningful and successful in bringing about behavior change among Latina mothers.

JOGNN



REVIEW

Factors Contributing to Infant Overfeeding with Hispanic Mothers

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ABSTRACT

Objective: To evaluate existing evidence on factors potentially contributing to infant overfeeding among Hispanic mothers that may explain the high infant overweight rates often seen among this ethnic group.

Data sources: Electronic databases including CINAHL and MEDLINE were searched for relevant studies published from 1998 to January 2012. Related article searches and reference list searches were completed on all included studies.

Study selection: Thirty-five studies (nine qualitative, 15 cross-sectional, nine cohort, and two longitudinal) were identified that met the following inclusion criteria: (a) studies of Hispanic-only or multiethnic mothers, (b) studies of healthy full-term infants or toddlers, (c) studies in which a majority of the sample included children within the target age group (0–24 months of age), and (d) studies conducted in the United States. The methodological quality of the studies ranged from fair to excellent.

Data extraction: Data extraction included content related to Hispanic infant feeding and weight gain.

Data synthesis: Reviewed research fell into three main foci of inquiry: breastfeeding and formula-feeding beliefs, attitudes, and practices; family and cultural influences of maternal feeding beliefs and practices; and maternal perceptions of infant feeding satiety and weight gain. The Preferred Reporting Items of Systematic Reviews Meta-Analysis (PRISMA) guidelines were followed for data extraction and reporting the results of this integrative review.

Conclusion: Three major feeding practices and beliefs among Hispanic mothers potentially contribute to infant overfeeding. Hispanic mothers are more likely to practice nonexclusive breastfeeding, initiate early introduction of solid foods including ethnic foods, and perceive chubbier infants as healthy infants. Cultural norms driving family influences and socioeconomic factors play a role in the feeding tendencies of Hispanics. Empirical research is needed to further define the primary factors that influence Hispanic mothers feeding decisions and practices that contribute to excessive weight gain in their infants.

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AWHONN

Childhood obesity remains a major public health problem in the United States (Ogden, Carroll, Kit, & Flegal, 2012). The Centers for Disease Control and Prevention (CDC) estimate that the childhood obesity rate has tripled from one generation ago (2012). Approximately 12.5 million (17%) of children and adolescents age 2 to 19 are obese (Ogden et al., 2012). Among infants and toddlers (birth to age 2), the prevalence of obesity has nearly doubled in recent decades. The 1999 to 2000 and 2009 to 2010 National Health and Nutrition Examination Surveys (NHANES) estimate that 9.7% of infants and toddlers were at $\geq 95^{\text{th}}$ percentile for weight-for-length (Ogden et al., 2012) and demonstrate unchanging high obesity rates in this age group. Obesity is a growing health issue for Hispanic infants and children. From 1999 to 2010, Hispanic infants persistently showed higher obesity prevalence rates

(14.8%) compared to Black (8.7%) or White infants (8.4%). Further, among children and adolescents, the odds of being obese were significantly higher for Mexican American males and females than White youth of both genders (Ogden et al., 2012).

Obesity trends are concerning in particular among Hispanic infants because longitudinal studies indicate that rapid weight gain during the first 2 years of life is associated with a greater risk of obesity during childhood and later in life (Nader et al., 2006; Owen, 2005; Stettler, Zemel, Kumanyika, & Stallings, 2002; Whitaker, Wright, Pepe, Seidel, & Dietz, 1997). Serious health consequences of obesity in older children and adults include cardiovascular disease, hypertension, and Type 2 diabetes (American Academy of Pediatrics [AAP], 2003; Barlow, 2007). Chronic diseases, in

Hispanic immigrant mothers are more likely than mothers born in the United States to initiate breastfeeding, but they are less likely to practice breastfeeding exclusively.

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particular Type 2 diabetes, disproportionately affect minority groups. Hispanics have the highest estimated lifetime risk for developing diabetes (males, 45.4% and females, 52.5%) compared to the general U.S. population (Narayan, Boyle, Thompson, Sorensen, & Williamson, 2003), and in 2008, Hispanics were 1.5 times more likely than Whites to die from diabetes (CDC, 2011). Obesity in Hispanic youth is potentially contributing to an increase of Type 2 diabetes in this group (AAP, 2003). According to a recent report by the CDC, one in three children born in 2000 will develop diabetes in their lifetime, and overall, Hispanic children are 1.5 times more prone than White children to develop the disease (2011). Thus, obesity prevention efforts must begin early in life and be targeted to high-risk groups such as Hispanic infants.

Recent research findings show ethnic and racial differences in prenatal and early-in-life risk factors related to obesity in infants. Although Black and Hispanic women are more prone to be overweight or obese prior to pregnancy, Hispanic women have a higher risk for gestational diabetes (CDC, 2011). Hispanic mothers are more likely than White or Black mothers to initiate breastfeeding, but they show low rates of exclusive breastfeeding at 6 months. Hispanic and Black mothers are more inclined to introduce solid foods before age 4 months and show greater maternal control over their infant-feeding patterns. In addition, compared to White infants, Black and Hispanic infants experience rapid weight gain in infancy (Snethen, Hewitt, & Goretzke, 2007; Taveras, Gillman, Kleinman, Rich-Edwards, & Rifas-Shiman, 2010). Little is known about the factors that contribute to rapid weight gain in infancy. Studies of Hispanic mothers indicate that their feeding beliefs and practices are likely to promote infant overfeeding. The purpose of this integrative review was to evaluate existing evidence on factors that potentially contribute to infant overfeeding among Hispanic mothers and may explain the high infant overweight rates often seen among this ethnic group.

The American Academy of Pediatrics (AAP) and World Health Organization (WHO) recommend

breastfeeding exclusively for the first six months of an infant's life (AAP, 2005; WHO, 2001). The AAP Committee on Nutrition supports introduction of appropriate complementary foods between age 4 and 6 months and continued breastfeeding for at least 12 months (AAP, 2005). In updated guidelines, the WHO now recommends using the growth of breastfed infants as the norm to which the growth of formula-fed infants should be compared (CDC, 2010). This recommendation is supported by the dietary guidelines for U.S. infants that are based on the nutritional components and average intake of human milk. As a result, the WHO (2006) released new international growth charts for use in children age < 24 months and recommend use of the 97.7th percentiles as the indicator of high weight for recumbent length in this age group.

The term *overfeeding* is not well defined in the literature. However, findings from observational studies of formula-fed infants show higher intakes of formula and other sources of energy to be positively associated with infancy weight gain and childhood body mass index (BMI) (Ong, Emmett, Noble, Ness, & Dunger, 2006). For the purpose of this review, *overfeeding* is defined as feeding behaviors leading to an energy intake for the infant that exceeds the requirements for normal growth and development.

Latinos or Hispanics represent a heterogeneous ethnic group of people with origins in the regions of Central America, including the Caribbean, South America, and other Spanish speaking cultures (Flores, 2000). Brazilians and Portuguese are also classified as Hispanic by federal and local government agencies. There is limited empirical evidence on the factors that contribute to overweight among infants other than for Mexican Americans. A better understanding of the factors underlying excessive weight gain in Hispanic infants could lead to the development of targeted preventive interventions important to improve infant health and well-being.

Methods

Data Sources and Extraction

An electronic search of journal articles was conducted for the purpose of locating published research focused on infant feeding in Hispanic mothers. The initial search strategy included broad and inclusive criteria to capture available research on the topic using MEDLINE and CINAHL

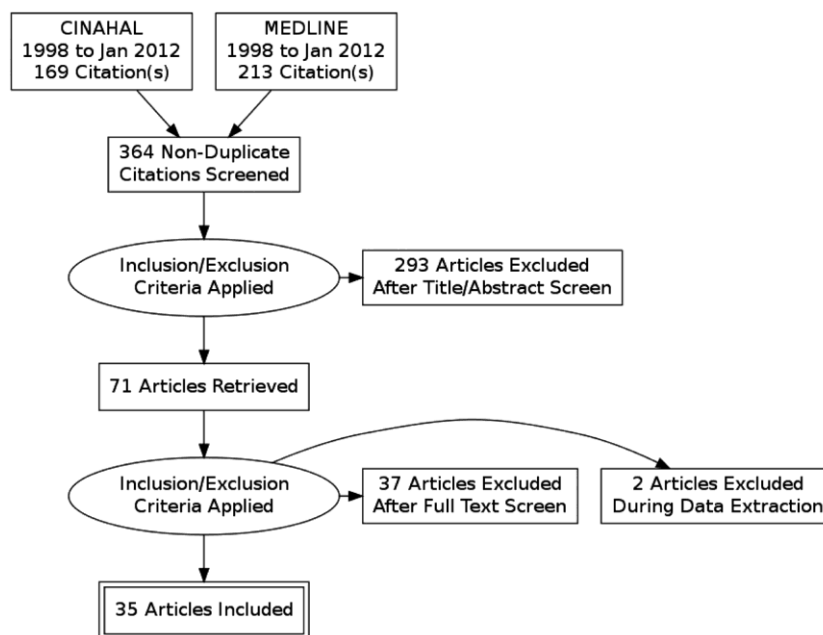


Figure 1. Decision Diagram for Article Selection.

databases. The search was limited to English language articles and published from 1998 to January 2012. To increase the possibility of identifying all relevant studies, related-article searches, and reference list searches were completed on all included articles. Electronic database searches were based on the following MeSH search terms: *Hispanic Americans, Latino, Hispanic, Puerto Rican, Spanish American, infant nutritional physiological phenomena, complementary feeding, supplementary feeding, feeding behavior, eating behavior, feeding pattern*.

Study Selection

Articles were selected for inclusion if they were published qualitative or quantitative studies that included content related to Hispanic infant feeding and weight gain. Articles were selected if (a) the study included Hispanic-only or multiethnic mothers, (b) the study included healthy full-term infants or toddlers, (c) a majority of the sample included children within the target age group (0–24 months of age), and (d) the study was conducted in the United States. We excluded (a) studies with preterm or low-birth-weight infants, (b) studies with infants with chronic illness, (c) studies in which the purpose was to develop or evaluate a feeding instrument, (d) studies in which the purpose was to evaluate a feeding intervention, and (e) multiethnic studies in which the re-

searchers did not analyze their sample data by different races/ethnicities.

A total of 364 articles were retrieved and evaluated for relevance. From this initial review, 293 studies were excluded based on the inclusion and exclusion criteria. Seventy-one abstracts were considered appropriate for comprehensive review. Articles meeting the inclusion criteria were reviewed for content related to infant feeding and weight gain, regardless of the aim of the study. Thirty-seven studies, initially identified as meeting inclusion criteria, were excluded for the following reasons: review studies, studies in which sample consisted primarily of older children, studies that did not focus on infant feeding, articles related to prevalence-only studies, intervention studies, studies of instrument psychometrics, and studies that did not analyze findings by ethnic groups. One article was excluded because study participants did not include mothers or caregivers. Two additional studies were excluded during data extraction because they analyzed retrospective data prior to 1998. Thirty-five articles met inclusion criteria. A diagram of the decision-making process for this integrative review is illustrated in Figure 1.

Data Extraction and Synthesis

Articles meeting the inclusion criteria were analyzed for relevant data. Each study's relevant data

were summarized and organized in a table format. The studies were then reorganized into three groups based on their main foci of inquiry. For this integrative review, the authors followed the guidelines of the Preferred Reporting Items of Systematic reviews Meta-Analysis (PRISMA) for guidance on extracting data and reporting results.

Results

The search yielded 35 eligible studies related to infant feeding with Hispanic-only mothers or studies with multiethnic participants in which findings were categorized by racial and ethnic groups. Among the Hispanic-only studies, seven study samples included Mexican Americans only. Sample sizes varied greatly because studies ranged from qualitative to longitudinal in nature. See Table 1 for further description of the studies. We found three primary foci: breastfeeding and formula feeding beliefs, attitudes, and practices (17 studies); family and cultural influences of maternal feeding beliefs and practices (12 studies); and maternal perceptions of infant feeding satiety and weight gain (6 studies). Several of the articles included content related to two or more of the identified foci. Table 2 provides a summary of the studies by main foci and other related foci are listed as appropriate.

Breastfeeding and Formula Feeding Beliefs, Attitudes, and Practices

Researchers on breastfeeding and formula feeding beliefs, attitudes, and practices of Hispanic mothers remarked on the many factors contributing to infant-feeding differences. Hispanic mothers are more likely to initiate breastfeeding but less likely to practice exclusive breastfeeding than White or Black mothers. Immigrant mothers are more inclined than U.S.-born mothers to breastfeed their infants (Gibson-Davis & Brooks-Gunn, 2006; Harley, Stamm, & Eskenazi, 2007), but an increase in the years of U.S. residence was associated with poor breastfeeding practices in Mexican American mothers. The median duration of exclusive breastfeeding was 1 to 2 months for women living in the U.S. for 10 or fewer years and less than one week for women living in the United States for 11 years or their entire lives (Harley et al., 2007). Bonuck and colleagues (2005) identified significant differences in intention to exclusively breastfeed between immigrant mothers and those native U.S. born, 42% versus 24% respectively.

Maternal acculturation appears to affect the feeding practices of Hispanics. Several researchers

Table 1: Description of Studies Included in Overfeeding Integrative Review

Characteristics	No. of Studies
Total number of studies selected	35
Publication dates	
1998 – 2000	2
2001 – 2005	9
2006 – 2012	24
Study design	
Observational cohort/longitudinal	11
Cross-sectional	15
Qualitative	9
Description of Hispanic subgroups	
Multiethnic, no description of	15
Hispanic subgroups	
Multiethnic, with description of	6
Hispanic subgroups	
Hispanic only, no subgroup description	4
Hispanic only, with subgroup description	3
One specific Hispanic subgroup	7

examined the influence of acculturation on breastfeeding practices (Anderson et al., 2004; Bonuck, Freeman, & Trombley, 2005; Celi, Rich-Edwards, Richardson, Kleinman, & Gillman, 2005; de Bocanegra, 1998; Gibson, Diaz, Mainous, & Geesey, 2005; Gibson-Davis & Brooks-Gunn, 2006; Gorman, Madlensky, Jackson, Ganiats, & Boies, 2007; Harley et al., 2007; Holmes, Auinger, & Howard, 2011; McKee, Zayas, & Jankowski, 2004; Vaaler, Stagg, Parks, Erickson, & Castrucci, 2010) using English language proficiency or a proxy such as years of U.S. residence as a measure of acculturation (Anderson et al., 2004; de Bocanegra, 1998; Gibson et al., 2005; Gibson-Davis & Brooks-Gunn, 2006; Gorman et al., 2007; Harley et al., 2007; McKee et al., 2004; Vaaler et al., 2010). Overall, breastfeeding intention and initiation was shown to be higher in less acculturated mothers. Gibson et al. (2005) analyzed maternal reasons for formula feeding by race and acculturation status. Highly acculturated Hispanics (49.8%) and White (57.8%) women cited their child's preference for the bottle as the major reason for formula feeding exclusively, but less acculturated Hispanics were more likely to state their child's physical/medical

Table 2: Integrative review results

Author/date	Participants	Methods	Outcomes
Breastfeeding and formula feeding beliefs, attitudes, and practices			
Anderson et al., 2004	161 low-income Puerto Rican mothers with children < age 6 (72% Puerto Rico born & 28% U.S. born)	Structured questionnaires with both close-ended and open-ended questions either in English (27%) or Spanish (73%). Variables included acculturation indicators, food insecurity, infant feeding practices and advice, household's social capital, general nutrition knowledge, food preparation methods, food-purchasing patterns, child & parent dietary intake, child & parent health status, child & parent anthropometry & respondent's lifestyle behaviors (smoking, alcohol, and drug abuse). Acculturation measure: Language preference	Women with more social capital were more likely (odds ratio [OR] = 2.25, [95% CI [1.02, 4.95]]) to have breastfed, suggesting social support is an important predictor of BF initiation in this community. Acculturation level was not associated with BF initiation.
Bartick & Reyes, 2011	17 Hispanic mothers in late pregnancy or newborn period Hispanic subgroups identified	Semistructured interviews—16 series of questions about attitudes on breastfeeding, colostrum, formula, expressing milk, and sources of influence.	Most common reasons for introducing formula: a) treatment for insufficient milk, b) keep the baby fuller longer, & c) planning to return to work. Many mothers believed breast milk alone to be insufficient to satisfy hunger and nutritional needs of growing child as little as 3 months.
Bonuck et al., 2005	382 pregnant women, Hispanic: 55% Black: 37% Hispanic subgroups identified	Survey instrument consisted of 42 items pertaining to demographics, pregnancy, plans after the baby, plus experience, knowledge, and attitudes toward breastfeeding. Acculturation measure: Immigration status (birth country).	Foreign-born women were significantly more likely to intend to BF exclusively (42% vs. 24% for U.S. born, $p < .05$). Country of origin and having breastfed a previous child were the only significant predictors of breastfeeding intention. Black (nonHispanic) and Hispanic women's breastfeeding plans were similar.
Bunik et al., 2006 ^b	29 Hispanic primiparous mothers of 4-6-month-old newborns	8 focus groups and 29 individual interviews with mothers using formula and combination feeding. Grandmothers and fathers-participated in 8 of the focus groups.	4 main feeding domains with 15 categories identified: a) Best of both, b) Breastfeeding can be a struggle, c) Not in mother's control, d) Family & cultural beliefs plus relatives encourage supplementation for babies who are crying or not chubby.

Table 2: Continued

Author/date	Participants	Methods	Outcomes
Celi et al., 2005	1,829 pregnant women, White 74% Black 18% Hispanic 8%	Telephone interviews 1 month postpartum. Questions related to breastfeeding intentions, race-ethnicity, social-cultural factors, & if mothers were breastfed as infants. Acculturation measure: Immigration status (birth country)	Black and Hispanic women were more likely to initiate breastfeeding than their White counterparts (Black women, OR = 1.9, 95% CI [1.3, 2.8]; Hispanic women, OR = 1.8 95% CI [1.1, 2.9]). Multivariate models that included race/ethnicity, social-economic, and demographic factors, showed foreign born women were more likely to initiate breastfeeding than U.S.-born women (OR = 3.2, 95% CI [2.0, 5.2]).
De Bocanegra, 1998	962 low-income immigrant women, Hispanic 17% Black 37% Hispanic subgroups identified	Self-administered questionnaire- measured informational support by health care providers and by family members. Acculturation measure: Set of 8 questions on language preference, proficiency in English, language use, social interaction, and lifestyle choices.	At postpartum visit: only 4% of mothers reported exclusive BF, 55% reported both formula & BF, 41% exclusively formula feeding. 90% of women started to feed formula after birth or within 1 week after delivery. Women who intended to breastfeed were 2.7 times more likely to BF than those who were negatively inclined or undecided. More acculturated women were 2 times less likely to decide to breastfeed than less acculturated women. More acculturated women reported more social support.
Gibson et al., 2005	460 nationally representative samples of non-Hispanic White women born in the U.S. and Hispanic women, White 74.9% Hispanic 25.1%	Self-reported survey used to assess BF attitudes/behavior & acculturation status. Acculturation Measure: Acculturation Scale (SAS), a 4-item Spanish language usage scale. Scale consists of the four questions about language proficiency and preference.	Prevalence of breastfeeding was higher in less acculturated Hispanic women (59.2%) than high acculturated Hispanic women (33.1%) and White women (45.1%). Less acculturated Hispanic women were more likely to cite their child's physical/medical condition as a reason not to breastfeed (53.1%), whereas Whites and more acculturated Hispanics were more likely to cite their child preferred the bottle (57.5% and 49.8%, respectively).

Table 2: Continued

Author/date	Participants	Methods	Outcomes
Gibson-Davis & Brooks-Gunn, 2006	4,207 mothers and 3,013 fathers (674 mothers were foreign born) Hispanic 27%, White 22%, Black 47%, Other 4%	Analyses of self-reported measures: a) Initial survey included demographic information collected within 48 hrs of the birth, and b) Follow-up survey obtained information about BF behaviors and was collected approx. 12–15 months later. Acculturation measure: Immigration status of both parents & length of U.S. residency.	Mothers born in the U.S. had 85% reduction in odds of BF & 66% reduction in the odds of BF at 6 months. Negative effect of length of residency for immigrants as an additional year of living in the U.S. was associated with a 4% decrease in odds of BF and a 3% decrease in odds of BF at 6 months.
Gill et al., 2004	Focus groups of Mexican American families, 10 pregnant women, 15 new mothers, 9 men & 5 grandmothers	Open-ended questions regarding perceived benefits of BF and barriers to BF.	All participants aware of the benefits of BF. Mothers identified time, embarrassment, and pain as barriers to BF. BF women who had support from family members had a more positive attitude toward BF.
Gorman et al., 2007	1,635 mothers, majority from Mexico (65.7%). Other Latin countries not identified	Most data, including BF status, were obtained from medical record reviews. Participants completed a short questionnaire to assess acculturation, selection of care site, and breastfeeding intentions. Acculturation measure: Country of birth and language spoken.	Exclusive BF rates were significantly different across acculturation groups. Low acculturation group were more likely to exclusively BF at discharge than those in the high acculturation group. White, English-speaking group had greater odds of exclusive breastfeeding when compared with those in high acculturation group (OR = 1.49, 95% CI [1.09, 2.19]).
Harley et al., 2007	490 Mexican decent mothers Years residing in U.S. ≤5 (54.3%) 6–10 (22.9%) ≥11 (13.1%) Entire life (9.8%)	Interviews conducted with mothers twice during pregnancy (end of the first and second trimesters), immediately postpartum, and when children age 6, 12, 24, and 42 months. Acculturation measure: Length of U.S. residency.	Increased years of residence in the U.S. associated with decreased likelihood of initiating BF and shorter duration of exclusive and any BF. Median duration of exclusive BF was 2 months for women living in the U.S. for 5 years or fewer, 1 month for women living in the U.S. for 6 to 10 years, and less than one week for women living in the U.S. for 11 years or more, or for their entire lives (lifetime residents).

Table 2: Continued

Author/date	Participants	Methods	Outcomes
Holmes et al., 2011	6,788 mothers of children age 0–71 months. Multiethnic,% of ethnic/racial groups not provided	Parents were asked retrospective infant feeding questions: a) exclusively breast-fed in the first week (EBF); b) combination breast and formula feeding (CBFF); c) stopped breastfeeding within the first week; and d) never breastfed. Acculturation measure: Country of birth.	Hispanic ethnicity and Black race found to be independent factors associated with CBFF. Ethnicity strongly associated with CBFF, 24.4% Hispanic infants and 17.9% of Black infants taking CBFF from the 1st week of life, as compared with only 7.2% of White infants. Infants of poorer families were also more likely to be CBFF, as were infants enrolled in WIC. Maternal factors associated with CBFF were non-U.S. birth and noncompletion of high school.
Kaufman et al., 2009 ^c	14 African American and 14 Puerto Rican postpartum mothers. Plus 8 family members.	28 semistructured individual and group interviews, participant observation.	Overall, mothers identified complementary feeding to be important in ensuring the child's wellness and fulfilling the good mothering role. Mothers believed a combination of foods was necessary to sate their children.
Li et al., 2008 ^c	1,323 mothers, Hispanic 7.3% Black 4.4% White 84.1%	Self-reported questionnaires-monthly throughout the infant's 1 st year of life. Questionnaires asked the mothers about BF practices. Mothers who stopped BF, rated importance of 32 reasons in their decision to stop BF on a 4-point Likert-type scale (<i>not at all important, not very important, somewhat important, or very important</i>).	Perception of infant not being satisfied by breast milk alone was 1 of top 3 most frequent reasons to stop BF. Hispanic mothers and those with a low-income were more likely to cite "Breast milk alone did not satisfy my baby" than White mothers.
McCann et al., 2007 ^c	971 WIC mothers. Multiethnic,% of ethnic/racial groups not provided	Mothers interviewed once prenatally, then monthly for first 7 months of infant's life, and again at 9 & 12 months. Interviews were conducted with a structured questionnaire & most were via telephone (computer- assisted telephone interviews).	Hispanic mothers most likely to agree with benefits of BF, & Black mothers most likely to agree with barriers. Concern about insufficient milk was common in all groups but Hispanic mothers more likely to agree with this statement. BF mothers who reported concern about insufficient milk breastfed for shorter durations and initiated formula earlier.

Table 2: Continued

Author/date	Participants	Methods	Outcomes
McKee et al., 2004	Sample part of large mental health study. Blacks (43%) Hispanic (57%)	Detailed interviews during pregnancy (third trimester), 2 weeks & 3 months postpartum. Intention to BF versus bottle-feed was assessed in initial interview. Infant feeding assessed in 2 postpartum interviews. Depressive symptoms and mother's closeness to her infant assessed at each of the postpartum interviews. Social support measured at third trimester interview and again at 3 months postpartum. Instruments included: a) Beck Depression Inventory (BDI-II), b) Mothers' perceived relationship to infant (MPRI), c) Norbeck Social Support Questionnaire (NSSQ), d) Biculturalism Scale, e) Postpartum experience. Acculturation measure: Biculturalism Scale assesses identification with Hispanic and American culture.	Rates of intention to BF were similar for Hispanic and Black women. Hispanics greater identification with Hispanic culture was associated with increases in BF intention. Hispanic BF mothers who introduced formula by 2 weeks postpartum were more likely than Blacks to be exclusively bottle feeding at 3 months. For all women, no relationship between BF practice and either social support or depressive symptoms was found. Mothers' perception of closeness to their infants was greater among breast feeders compared to bottle feeders.
Vaaler et al., 2010	4,080 WIC mothers of 1-year-old children. Hispanic 63% English speaking 75%	Surveys questions on infant feeding practices (BF, formula feeding, and introduction of complementary food), attitudes toward BF, and reasons why not to breastfeed. Attitudes toward BF were measured using 3 mean indices: a) Benefits of BF index, b) Acceptance of public BF index, and c) Formula index. Each index was calculated as the mean of participants' responses to a series of	Eighty-eight percent of Spanish speaking Hispanic mothers, agreed with "I would encourage my friends to breastfeed" and 87% agreed with "your family thinks mothers should breastfeed." English speaking Hispanic mothers & Spanish speaking Hispanic mothers had more favorable attitudes than non-Hispanic mothers toward benefits of BF but they also viewed formula more favorably. Spanish-speaking Hispanic mothers had greater odds of exclusive BF (OR = 5.4, $p < .001$) and greater odds of using both

Table 2: Continued

Author/date	Participants	Methods	Outcomes
		questions. All responses were Likert-type scales and coded such that 5 = <i>strongly agree</i> and 1 = <i>strongly disagree</i> . Acculturation measure: Spanish- or English speaking Hispanic.	formula and breast milk (OR = 2.8, $p < .001$) compared to non-Hispanic mothers.
Family and cultural influences of maternal feeding beliefs and practices			
Chaidez et al., 2011 ^c	18 Mexican-American mothers of 12- to 47-month-old children. 14 mothers Spanish speaking and 4 English speaking	Semistructured interviews. Constant comparative method.	Mothers voiced concern in waiting too long to introduce solids. Mothers believed infants would reject foods or possibly get sick if consuming foods not accustomed to. Mixed maternal responses on the desirability of chubby baby size.
Crocetti et al., 2004 ^{a,c}	102 female caregivers of 4-month old children. Black 34% White 41% ,Hispanic 18%	13-item questionnaire elicited information about current & past feeding methods, use of solid foods, & awareness of infant feeding guidelines.	Percent of caregivers who introduced cereal at less than age 4 months varied by race: Black (54%), White (45%), & Hispanic (22%). 3 most common reasons given for early introduction of cereal: a) infant not satisfied with formula or breast milk alone (80%); b) sleep is better at night (53%); c) advice of friend or family member. 77% of mothers aware of AAP recommendations on infant feeding.
Evans et al., 2009 ^c	659 parents of age 1 - age 5 years children. Hispanic 55% White 33% Black 13% 23% of Hispanics reported speaking mostly Spanish at home	Preschooler Feeding Questionnaire (PFQ). PFQ includes five subscales: a) child overeating concerns, b) child underweight concerns, c) difficulty with picky eating, d) using food to calm, and e) pushing child to eat. Demographic questions assessed ethnicity/race, household income, parent education level, acculturation, and WIC participation. Acculturation measure: Primary language spoken at home.	Significant differences for the PFQ subscales were noted for ethnicity/race, acculturation, and income level. Spanish speaking Hispanic participants were significantly more worried about their child being underweight than English speaking Hispanic participants. Spanish-speaking Hispanics and Black respondents were more likely than English speaking Hispanics to use food to calm the child.

Table 2: Continued

Author/date	Participants	Methods	Outcomes
Gross et al., 2010 ^c	439 Hispanic mothers at initial interview, 368 (84%), completed follow-up survey 3 months later; infant's age: < 5 months	Self-reported maternal perceptions of infant hunger and satiety and pressuring feeding style - five adapted statements from existing scales for older children or developed by the researchers; responses based on a 4-point Likert-type scale but dichotomized as agree versus disagree. Acculturation measure: Place of birth.	Most mothers perceived that infants sense their own satiety (93%). But 72% believed that infant crying must indicate hunger; 53% believed mothers should always make babies finish the bottle ("pressure to feed"). Two perceptions of feeding cues were related to pressuring feeding style: belief that infant crying must indicate hunger (adjusted OR[AOR] = 2.59; 95% CI [1.52, 4.42]) and infant hand sucking implies hunger (AOR = 1.83, 95% CI [1.10, 3.03]). Mothers born outside the U.S. and with less education were more likely to have pressuring feeding styles (AOR = 3.05, 95% CI [1.66, 5.60] and AOR = 1.81, 95% CI [1.12, 2.91], respectively).
Higgins, 2000 ^{a,c}	10 key informants (5 Puerto Rico born & 5 U.S. born), self-described as Puerto Rican with an infant in the family < 4 months; plus 5 general informants	Field notes, participant observation experiences, and tape recordings of selected individual interviews.	11 universal & 2 diverse themes of culture care were identified. Some include a child is healthy if he or she is big and chunky; cultural belief that big is beautiful; cultural practice of overfeeding infants; feeding children traditional foods to make them big and healthy; feeding patterns are overtly influenced by traditional celebrations of religious holidays; no breastfeeding intention; non-milk food added to the bottle at an early age; sense of commitment by grandmothers, older sisters, and sisters-in-law to teach the new mother all about feeding her infant; little intercultural borrowing from the dominant culture related to feeding practices.
Kaufman & Karpati, 2007 ^c	60 informants, including 12 families and their extended kin & friends. Children between age	Individual & group interviews, life histories, and participant observation. Experiences and tape recordings of selected individual interviews.	Families believed food to be an easily available source of gratification for parents & children. Parents believed providing plenty of food and feeding their children to be associated with good parenting.

Table 2: Continued

Author/date	Participants	Methods	Outcomes
	2 months to 21 years Hispanic subgroups identified		Families' economic and cultural influences determined feeding practices.
Kuo et al., 2010 ^a	1,894 parents of children age 4–35 months Multiethnic Nationally representative sample	Telephone surveys of 3 main questions: a) Age of child when solid foods introduced (between 0–3 months, 4–6 months, 7–9 months, or after 9 months); b) Length of time of BF (1 month or less, 2 or 3 months, 4 months through 7 months, or more than 8 months; and c) Have doctors or health providers discuss issues related to food or feeding such as the introduction of solid foods? Acculturation measure: Spanish- or English speaking Hispanic.	BF initiation greatest in Hispanic Spanish speaking mothers (over 80%) followed by White and Hispanic English-speaking mothers (about 70%) and African American mothers (46%). Duration of BF similar among African American and Hispanic English speaking mothers and higher for White and Hispanic Spanish speaking mothers. English speaking Hispanic (58%) and Spanish speaking Hispanic (66%) mothers had higher rates of introduction of solids during the 4–6 months compared to Whites (47%) and African Americans (40%). Most parents (92%) of children 4–9 months age, reported provider discussion of introduction of solids was not associated with their time of initiation.
Mennella et al., 2006 ^a	National stratified random sample: Hispanic 371 Non-Hispanic 2,637, parents of infants and toddlers 4–24 months old	Interviewers used the Nutrition Data System for Research (NDS-R) to collect dietary recalls. Parents or primary caregivers provided via telephone a 24-hour dietary recall of all foods and beverages consumed by the child during the previous day and were asked specific questions regarding the age at which their infants were first fed infant formula, infant cereals, cow's milk, and pureed foods on a daily basis.	Hispanic infants age , 1 year were more likely to have ever been breastfed and those who were 4 to 5 months more likely than non-Hispanics to be eating pureed baby foods on a daily basis. 6- to 11-month-old Hispanics were more likely to be eating fresh fruits, fruit-flavored drinks, baby cookies, and foods such as soups, rice, and beans but less likely to be eating noninfant cereals and baby food vegetables. This was also the case for 12- to 24-month-old toddlers.
Miller & Harwood, 2002	60 middle-class mothers (32 White	Mothers interviewed about long-term socialization	Across time and context, White mothers show patterns of beliefs

Table 2: Continued

Author/date	Participants	Methods	Outcomes
	28 Puerto Rican) All Puerto Rican mothers were living in Puerto Rico. Mothers of 4-month-old infants at time of enrollment	goals and videotaped during feeding and social play with their infants at age 4, 8, and 12 months. Videotaped feeding (8 min.) and social play (5 min.) during all 3 visits. Videotaped mother–infant interactions were coded in real time using the Interact software program.	and behaviors that emphasized the infant's personal choice and mastery of the situation, whereas the Puerto Rican mothers were more likely to show patterns of beliefs and behaviors that emphasized the infant's interdependence on the mother. Puerto Rican mothers were more likely to feed their infants on their laps and spoon-feed rather than encourage self-feeding at 12 months. Groups did not differ in their display of nurturing behaviors.
Sussner et al., 2008 ^{a,c}	31 Hispanic mothers Hispanic subgroups identified	6 focus groups and 20 individual in-depth interviews. Acculturation measure: Marin Acculturation Scale assesses 3 domains: a) language use, b) media use, c) ethnic-social relations.	Hispanic mothers described strong cultural influence to: eating large quantities of food; encouraging children to “finish their plates”; and belief that providing a lot of food is equated with good parenting. They describe facing resistance from older relatives when they feed their children less.
Wojcicki et al., 2011 ^a	201 Hispanic pregnant women	Infant dietary recall and postpartum depressive symptoms were assessed at 4- and 6 weeks postpartum.	More than one half of mothers were feeding infant formulas & 25.4% were supplementing with water or tea (of those providing water or tea, 60% did it daily).
Worobey et al., 2008 ^c	67 Mexican mothers of 6-month-old infants. Convenience sample, mothers who chose exclusively formula feedings	2-day home visits. Day 1: interviews; day 2: completion of self-reported surveys and 24-hr recall. Measures: a) Maternal Feeding Attitudes (MFA): 10 item questionnaire-maximum 20 score indicates “pushy” feeding attitude; b) Pictorial Assessment of Temperament (PAT): 10 item measure-provides mean from 1 to 3; (c): infant behavior diary: 24-hr recall of infant's activities-sleeping, awake/playing, crying, and being fed.	Only the number of infant crying episodes was predictive of infant feeding ($\beta = .246$, $p = .07$), with a strong correlation between infant feeds and crying episodes ($r =$.35 ($p < .01$)).

Table 2: Continued

Author/date	Participants	Methods	Outcomes
Maternal perceptions of infant feeding satiety and weight gain			
Davis et al., 2012 ^a	Caregivers of 1483 Hispanic children age 2 to 4 years enrolled in WIC program Children of Hispanic descent selected from a random sample of WIC participants	Telephone survey. Initial survey included 126 questions related to early-life feeding practices and nutritional intake. Sugar-sweetened beverage (SSB) was defined as sodas or other sweetened drinks but not 100% juice. BF history categorized as: no BF, >1 wk to < 6 mo BF, 6 to <12 mo BF, and > 12 mo BF. SSB intake categorized as: high SSB (≥ 2 SSBs/d), mid SSB (1 SSB/d), and no SSB. Parental self-reported height & weight were also obtained. Children's anthropometric measures were obtained from WIC.	Children breastfed for ≥ 12 months had 45% lower odds of being obese and 28% lower odds of being overweight. Compared with participants with a high SSB intake, consuming no SSBs had 31% lower odds of being obese. Combined effect was stronger, for BF participants for ≥ 12 months and no SSB intake having > 60% decrease in the odds of obesity compared with those with no BF and a high SSB intake.
Reifsnider et al., 2008 ^{a,b}	100 Mexican American children ages 12 to 24 months in each of the 3 conditions: stunted, normal-size, and overweight	Instruments used: NCATS, ARSMA II, 24-hr diet recall, & Baecke Activity Questionnaire.	a) normal size group was breastfed longest and overweight group the shortest length of time; b) overweight group had significantly higher daily intakes of Mexican rice & Kool-Aid; c) No significant differences in home environment; d) maternal and paternal BMIs for overweight group significantly higher than for normal group; e) significant increase% of mothers, maternal grandmothers, and maternal grandfathers who were born in U.S. in overweight group.
Reifsnider et al., 2006	374 low-income Hispanic children between age 12 –24 months.	Children followed for 14 mos.; measures collected at baseline & every 6 months. 3 variables measured: a) host variables: weight, height, and early feeding history; b) agent variables: dietary intake, food available, food insecurity experienced; & c) environmental variables (microsystem):	In overweight group, mothers' BMI & number of servings of fat in children's daily diet positively associated with their wt/ht%; servings of protein and children's reporting of hunger were negatively associated with their wt/ht%. In children with wt/ht% > 95th (overweight), age was positively associated with wt/ht%, and a trend was seen for negative

Table 2: Continued

Author/date	Participants	Methods	Outcomes
		mother–child relationship and home environment; plus (mesosystem) variables of acculturation and employment. Acculturation measure: ARSMA assesses 3 domains: a) language use, b) ethnic identity, c) ethnic interaction.	relationship with wt/ht and mother–child interaction (NCATS).
Sussner et al., 2009	108 low-income primarily Hispanic mother–child pairs enrolled in WIC. Multiethnic	Interviewer-administered surveys conducted 6 to 20 weeks postpartum. Child's BMI z score was computed at 24 & 36 months. Acculturation measure: Included: nativity (born in the United States vs. foreign born), parents' nativity, length of U.S. residence (< 8 years vs. ≥ 8 yrs.), and exclusive use of native language vs. nonexclusive use (mixed or English only).	At age 24 months, children of mothers with exclusive use of native language had higher BMI z scores compared to children of mothers with nonexclusive use ($\beta = .74$, $p = .02$).
Worobey et al., 2009	96 mothers; newborns followed to 12 months, Hispanic 76% Black 24%	Repeated observations during home visits at age 3, 6, and 12 months. Measures: a) MFA; b) maternal sensitivity to infant cues subscale of the Nursing Child Feeding Assessment Scale (NCATS); c) infant diet (24-hr recall).	Mothers who were less sensitive to satiety cues had infants who gained more weight. Backward regression analysis showed both number of feeds per day at 6 months and maternal sensitivity (inversely) were significant related to weight gain from age 6 to 12 months.
Worobey & Lopez, 2005 ^b	240 mothers of 1-month-old infants, Mexican 38% other-Hispanic 30% Black 23% White 9% Exclusively formula feedings	Instruments: a) Baby Rating Scale (BRS), a line drawing continuum of 9 babies who differed by size, from leanest to fattest; b) MFA measures how much a mother may “push” feeding under different circumstances.	Mothers in both subgroups of Hispanics estimated their infants as leaner and indicated a heavier infant as desirable, relative to White mothers. Hispanic & other-Hispanic mothers reported greater level of maternal “pushiness” relative to the White mothers in terms of their attitude toward feeding their infants.

Note. BF = breastfeeding

^aStudy included content related to focus breastfeeding and formula feeding beliefs, attitudes, and practices.

^bStudy included content related to focus family and cultural influences of maternal feeding beliefs and practices.

^cStudy included content related to focus maternal perceptions of infant feeding satiety and weight gain.

Cultural traditions shape family influences that determine Hispanic mothers' beliefs and behaviors about infant feeding.

condition as the reason for deciding not to breast-feed.

Hispanic mothers have favorable beliefs about breastfeeding and formula feeding (Bartick & Reyes, 2011; Bunik et al., 2006; Vaaler et al., 2010). Hispanic mothers recognize some of the benefits of breastfeeding, however they often provide complimentary formula feeding for fear of having insufficient breast milk and inability to keep their infants sated (Higgins, 2000; Kaufman, Deenadayalan, & Karpati, 2009; Li, Fein, Chen, & Grummer-Strawn, 2008; McCann, Baydar, & Williams, 2007). Concern about breast milk supply is a common reason for introducing formula or stopping breastfeeding. A group of researchers explored Hispanic women attitudes on non-exclusive breastfeeding and showed these mothers prefer "*la dos cosas*" or breast and bottle-feeding (Bartick & Reyes, 2011; Bunik et al., 2006). Although many of these mothers described breastfeeding as "healthier" for the infant, many believed a combination of breast milk and formula feeding was better because it provides the infant with the benefits of breast milk and the vitamins and nutrients present in formula (Bunik et al., 2006).

Combining breast milk and formula feeding has unique implications in Hispanic women. Hispanic women who plan to combine breastfeeding and formula feeding usually breastfed for shorter duration than those intending only to breastfeed, as shown by Gill, Reifsnider, Mann, Villarreal, and Tinkle (2004). The effects of combination of breast milk and formula feeding (CBFF) on breastfeeding duration were analyzed using data from the National Health and Nutrition Examination Survey (NAHNES, 1999–2006) (Holmes et al., 2011). Researchers found ethnicity to be independently associated with CBFF, with 24.4% of Hispanic infants and 17.9% of Black infants taking breast milk and formula daily beginning at the first week, as compared with only 7.2% of White infants. Low-income families and those enrolled in Supplemental Nutrition Program for Women, Infants and Children (WIC) were also more likely to receive CBFF. These findings are congruent with results from other studies on the association of low-socioeconomic status and WIC participation as possible moderators of exclusive breastfeeding rates among Hispanic

mothers (Li et al., 2008; McCann et al., 2007; Vaaler et al., 2010; Wojcicki et al., 2011).

Hispanic infants receiving CBFF or formula feeding exclusively tend to have higher than recommended caloric intakes. Higgins (2000) conducted a qualitative study of Puerto Rican families and found that infant feedings far exceeded the nutritional requirements and often doubled the amount of formula recommended by the AAP. Beginning at age 2 months, these mothers often fed their infants additional milk with added sugar and baby food in the bottles. Holmes and colleagues (2011) found that in contrast to CBFF and formula feeding, infants exclusively breastfed for 4 months showed a decreased risk for overweight/obesity between age 2 and 6 years. Review of findings from these studies demonstrate Hispanic mothers have a higher inclination toward breastfeeding, but they also commonly supplement with formula feeding and other foods for reasons that are not clearly understood but are likely culturally driven.

Family and Cultural Influences of Maternal Feeding Beliefs and Practices

Hispanic mothers' beliefs and behaviors about infant feeding are determined by cultural traditions. Most of the research in this area is focused on the feeding of older children, and many of the studies are descriptive or qualitative. In a qualitative study exploring the socioeconomic and cultural roots of childhood obesity among low-income Hispanic families, researchers found that food is an important and easily available source of gratification for parents and children (Kaufman & Karpati, 2007). The parents and grandparents associated feeding with expressions of nurturing and caring. For Hispanic families, satisfying children's desires to eat was perceived as an important sign of good parenting (Kaufman & Karpati, 2007; Sussner, Lindsay, Greaney, & Peterson, 2008) but often involved allowing unhealthy food choices and overfeeding (Kaufman & Karpati, 2007). This is consistent with others studies in which Hispanic mothers were found to be indulgent in their feeding styles of preschoolers (Chaidez, Townsend, & Kaiser, 2011; Evans et al., 2009; Hughes et al., 2006).

Influential family members like grandmothers commonly guide Hispanic mothers' feeding beliefs and practices. Hispanic mothers often choose not to follow clinicians' advice about infant feeding, especially if this information is not in

accordance with family members' and friends' advice (Higgins, 2000; Kuo, Inkelas, Slusser, Maidenbergl, & Halfon, 2010). In a study by Bunik and colleagues (2006), Hispanic mothers reported receiving advice and pressure from family members and fathers to supplement with formula if the infants were fussy or not *gordito* (chubby). A common feeding practice among Hispanic mothers is the early introduction of solids including ethnic foods. Hispanic mothers often introduced solid foods and cereal before the infants were age 4 months (Chaidez et al., 2011; Crocetti, 2004; Higgins, 2000; Kuo et al., 2010). Research by Kuo and associates (2010) on factors associated with early or late introduction of solids revealed 58% of English speaking Hispanic and 66% of Spanish speaking Hispanic mothers had higher rates of introduction of solids between age 4 to 6 months than Black and White mothers. In contrast, Crocetti (2004) found lower rates of early introduction of cereal among Hispanics (22%) as compared to Whites (45%) and Blacks (54%), but the Hispanic sample size was small.

Differences in parenting practices also influence Hispanic mothers' feeding patterns and behaviors. Miller and Harwood (2002) found Puerto Rican mothers were more likely to exhibit beliefs and behaviors that emphasized the infant's interdependence on the mother than White mothers. Puerto Rican mothers were more likely to feed their infants on their laps and to spoon-feed them rather than encourage self-feeding at 12 months. In a more recent qualitative study, Hispanic mothers expressed the belief that mothers should always make their infants finish their bottles (Gross et al., 2010). Among Hispanics, differences in maternal feeding beliefs and practices are determined by family and cultural views on what is believed to be appropriate feeding for keeping an infant comfortable and well nourished.

Maternal Perceptions of Infant Feeding Satiety and Weight Gain

Maternal perceptions of infant weight status and weight gain often results from deep-seated cultural beliefs about what constitutes a healthy weight (Higgins, 2000; Worobey & Lopez, 2005). The Hispanic mothers perceived weight status of their infants appeared to guide many of their daily feeding decisions. In three studies, Hispanic mothers associated increased body weight with a sign of good health therefore had difficulty recognizing obesity in their children (Higgins,

2000; Kaufman et al., 2009; Worobey & Lopez, 2005). Worobey and Lopez (2005) found Mexican mothers perceived their infants as lean and preferred heavier infants more often than other ethnic groups. In others studies, mothers from different Latin countries showed a preference for a heavy infant (Davis, Whaley, & Goran, 2011; Higgins; Kaufman & Karpati, 2007). For these mothers, "a chubby baby is a happy and healthy baby," which fosters an increased maternal sense of identity and efficacy.

Maternal perception of infant's feeding satiety contributes to feeding practices as well. Hispanic mothers often interpreted infant crying and fussiness as feeding cues and indicators of hunger (Gross et al., 2010; Worobey, Islas Lopez, & Hoffman, 2008), and the number of crying episodes was the only predictive factor of infant feeding in a study of Mexican immigrant women (Worobey et al., 2008). In a later study, the number of feeds per day at 6 months and the maternal lack of sensitivity to infant's satiety cues were significantly related to infant's weight gain from age 6 to 12 months (Worobey, Islas Lopez, & Hoffman, 2009).

Dietary intake differs significantly in overweight versus normal weight Hispanic infants. In a comparison study of Mexican American children, Reifsnider and Ritsema (2008) found significant differences in the dietary intake of overweight infants. The overweight group had significantly higher daily intakes of Mexican rice and Kool-Aid and shorter duration of breastfeeding compared to a group of normal growing infants. Their findings concur with previous results from the 2002 Feeding Infants and Toddlers Study (FITS) (Mennella, Ziegler, Briefel, & Novak, 2006), which showed that 6- to 11-month-old Hispanics were more inclined to consume foods that are common in many Hispanic cultures. In another study, daily servings of fat and maternal BMI were positively associated with the infants' weight/height percentiles (Reifsnider, Keller, & Gallagher, 2006). Davis et al. (2011) examined the independent and additive effects of breastfeeding and sugar-sweetened beverage (SSB) intake in infancy on overweight and obesity prevalence. Overall, children who were breastfed for at least 12 months and did not consume SSBs had a 60% decrease in the odds of obesity (95% confidence interval [CI]: [0.19, 0.80]), compared to children who were not breastfed and reported a high SSB intake. Findings from these studies demonstrate an association between maternal perception of infant's feeding satiety and

weight, her feeding practices, and the resulting weight gain in Hispanic infants.

Discussion and Implications

The purpose of this review was to evaluate existing evidence on factors that potentially contribute to maternal overfeeding of Hispanic infants and thus provide an explanation for the high infant overweight rates found in this ethnic group. The major findings from the current state of the science point to the following factors contributing to maternal feeding decisions and practices and thus possible overfeeding. First, it is clear immigrant Hispanic mothers are more likely than U.S. born mothers to initiate breastfeeding, but also they are less likely to breastfeed exclusively (Bonuck et al., 2005; Gibson-Davis & Brooks-Gunn, 2006; Harley et al., 2007). The most common reason given by mothers for nonexclusive breastfeeding was fear of having an inadequate milk supply (Higgins, 2000; Kaufman et al., 2009; McCann et al., 2007). Although some Hispanics understand the related health benefits of breastfeeding for mother and infant (Gill et al., 2004; McCann et al., 2007), they may lack understanding of why early supplementation with formula may in turn interfere in establishing an adequate breast milk supply (Brownell, Howard, Lawrence, & Dozier, 2012; McCann et al., 2007). Increased prenatal and postnatal breastfeeding education and support efforts should be guided toward encouraging these mothers to avoid early and unnecessary formula supplementation that could be detrimental to successful exclusive breastfeeding.

Another important factor that contributes to nonexclusive breastfeeding practices in Hispanics is the belief that feeding a combination of breast milk and formula is best for the infant (Bartick & Reyes, 2011; Bunik et al., 2006). This belief may be reinforced by free formula packages given postpartum at hospital discharge and by WIC agencies (Howard, Howard, & Weitzman, 1994; McCann et al., 2007; Vaaler et al., 2010) and may explain why immigrant Hispanic mothers are more inclined to early supplement breastfeeding with formula. Research shows WIC participants often demonstrate inadequate breastfeeding practices (Li et al., 2008; McCann et al., 2007; Vaaler et al., 2010) even though WIC programs provide education and support to breastfeeding mothers (AAP, 2001). There may be multiple explanations as to why enrollment in WIC correlates with increased formula feeding. It is important for WIC and other agencies serving Hispanic mothers to increase

their efforts in promoting culturally sensitive nutritional programs that reinforce the value of exclusive breastfeeding as a complete source of nutrition for infants. The use of breastfeeding peer counselors is shown to be an effective intervention to promote exclusive breastfeeding among minority women and could prove to be beneficial to Hispanic mothers through bilingual counselors in the WIC programs (Chapman & Perez-Escamilla, 2012).

One of the goals of the Healthy People 2020 is increasing the rate of infants who are ever breastfed. Hispanic women continue to have the highest prevalence of breastfeeding at birth, 6, and 12 months postpartum (CDC, 2013). However, for each year that a Hispanic mother lives in the United States, there is a 4% decrease in the odds of breastfeeding and a 3% decrease in the odds of breastfeeding at 6 months (Gibson-Davis & Brooks-Gunn, 2006). Studies on the influence of acculturation on breastfeeding rates have shown an inverse correlation between maternal level of acculturation and the likelihood of breastfeeding (Gorman et al., 2007; Vaaler et al., 2010). One exception was a study of Puerto Rican women (Anderson et al., 2004) that found no association between breastfeeding intention and acculturation level. Interpretation of findings is difficult because the population of many of the reviewed studies consisted predominantly of Mexican Americans (Gorman et al., 2007; Harley et al., 2007; McKee et al., 2004), and English language proficiency or years of U.S. residency were used as measures of acculturation. A more comprehensive measure of acculturation is required (Beck, 2006) to fully determine its effect on feeding practices of Hispanics. Overall and for reasons not clearly understood, the longer immigrant Hispanic mothers live in the United States, the greater the chances that these mothers will not breastfeed at all. Research is needed to further explore the reasons behind this breastfeeding disparity and develop interventions aimed at promoting behavior change to improve breastfeeding rates among more acculturated mothers.

The second key finding was that cultural traditions and advice from family members play an important role in maternal feeding beliefs and practices (Bunik et al., 2006; Higgins, 2000; Kaufman & Karpati, 2007). Families support breastfeeding (Gill et al., 2004; Vaaler et al., 2010), but it is also common for Hispanic family members to recommend complementary feedings such as adding rice cereal to the bottle of formula (Higgins,

2000). Immigrant Hispanic mothers face many personal, economic, and social hardships. These families often live in crowded housing where relatives and friends share limited living space and finances. Grandparents and relatives are commonly involved in caring for young children at home (Kaufman & Karpati, 2007). Overfeeding is likely to occur when many extended family members are involved in feeding the infant (Higgins, 2000; Kaufman & Karpati, 2007), and working mothers often have little control over the feeding practices of their infants' caregivers. In addition, given that Hispanic mothers often do not follow clinicians' advice about infant feeding (Higgins, 2000; Kuo et al., 2010), it is important to determine the level of extended family involvement when evaluating feeding practices of Hispanic families (Bunik et al., 2006; Higgins; Kaufman & Karpati, 2007). Clinicians must make every effort to clarify any misunderstanding and encourage mothers to discuss appropriate feeding practices with their family members and infants' caregivers.

Furthermore, results from studies with Mexican immigrant mothers revealed maternal beliefs that encourage pressure-feeding styles (Gross et al., 2010) and limited maternal understanding of developmentally appropriate feeding cues (Gross et al., 2010; Worobey et al., 2008, 2009). This type of feeding pattern may interfere with an infant's innate ability to self-regulate intake when feeling full. Researchers have postulated the possible reasons for breastfeeding protection against obesity is because breast milk supply is based on infant's demand and that the infant will consume what is needed (Lawrence, 2010). But gaps remain in our understanding of the feeding practices of exclusive formula feeders and the type of interventions that will promote appropriate feeding behaviors among nonbreastfeeding mothers. Parents of formula feeders need increased awareness and comfort with the idea of allowing their infants to guide the amount of milk consumed during feeding, which may contribute to better eating behaviors later in life.

An important factor that could potentially contribute to overfeeding, relates to the third major finding. Hispanic mothers often believe that a "chubby" baby is a healthier baby (Higgins, 2000). Studies have shown Hispanic mothers prefer heavier babies and often have difficulty identifying that their infant is overweight (Worobey & Lopez, 2005). Mothers often feel pressure by family members to increase their feedings if the infant is perceived as thin (Bunik et al., 2006; Higgins, 2000).

The belief that "a chubby baby is a happy and healthy baby" may predispose Hispanic mothers to overfeeding practices.

Family members' views of the infant's weight, and thus, health status, are extremely important for Hispanic mothers (Higgins, 2000; Kaufman et al., 2009; Kaufman & Karpati, 2007; Sussner et al., 2008), but these mothers may be unaware of the significant and serious life-long health consequences resulting from being an overweight or obese infant. Mass media campaigns on Hispanic networks may play a role in increasing awareness of the connection between the risk of infant obesity and the development of health disparities commonly affecting this population.

Future research is needed to further define the primary driving forces behind immigrant Hispanic mothers' feeding decisions and practices. A better understanding of family environments and socioeconomic factors could help explain the infant overfeeding tendencies of immigrant Hispanics. Because familial patterns of obesity are commonly seen among Hispanic groups, future research should also illuminate positive biological mediators for obesity in these infants. In addition, findings from future empirical studies should contribute to the development of targeted preventive interventions that will improve the overall health and well-being of Hispanic infants and their families by successfully changing feeding beliefs and behaviors in this ethnic group.

Conclusion

Our findings highlight the fact that feeding practices and beliefs of Hispanic mothers are embedded in cultural views of what constitutes healthy infant feeding practices and weight gain. Cultural norms driving family influences guide common maternal feeding practices that foster potential infant overfeeding behaviors. In addition, socioeconomic factors such as easier access to formula may play a significant role in the infant feeding practices of Hispanics. At present, there is limited research on excessive weight gain in Hispanics infants, but these findings point to the dietary intake and overfeeding practices as contributing factors. Future research should focus on the development of culturally sensitive interventions aimed at improving breastfeeding knowledge, awareness, and practices among mothers and families and thus improving health outcomes for Hispanic infants and future generations.

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Chapter 3 – IRB Proposal

VCU RESEARCH PLAN TEMPLATE

Use of this template is required to provide your VCU Research Plan to the IRB. Your responses should be written in terms for the non-scientist to understand. If a detailed research protocol (e.g., sponsor's protocol) exists, you may reference specific sections of that protocol. **NOTE: If that protocol does not address all of the issues outlined in each Section Heading, you must address the remaining issues in this Plan. It is NOT acceptable to reference a research funding proposal.**

ALL Sections of the Human Subjects Instructions must be completed with the exception of the Section entitled "Special Consent Provisions." Complete that Section if applicable. When other Sections are not applicable, list the Section Heading and indicate "N/A."

NOTE: The Research Plan is required with ALL Expedited and Full review submissions and MUST follow the template, and include version number or date, and page numbers.

DO NOT DELETE SECTION HEADINGS OR THE INSTRUCTIONS.

I. TITLE

Infant feeding practices and beliefs of Latina mothers

II. RESEARCH PERSONNEL

A. PRINCIPAL INVESTIGATOR

List the name of the VCU Principal Investigator

SUZANNE AMERINGER, PhD, RN Student Advisor/Dissertation Chair
DIANA CARTAGENA, RN, MSN, CPNP Student Investigator

VERSION: 8-13-13

B. STUDY PERSONNEL

NOTE:

1. Information pertaining to each project personnel, including their role, responsibilities, and qualifications, is to be submitted utilizing a *VCU IRB Study Personnel Information and Changes Form*. This form is available at <http://www.research.vcu.edu/forms/vcuirb.htm>.
2. A roster containing a list of project personnel is to be maintained as a separate study document which is retained with the Research Plan, and is to be updated as applicable. The roster is to include all VCU project personnel (including the principal investigator) who are *engaged* in this research protocol, as well as non-VCU personnel who are also *engaged* but do not have local IRB approval for this protocol from their own institution,. This template document, entitled *VCU IRB Study Personnel Roster*, is available at <http://www.research.vcu.edu/forms/vcuirb.htm>.

C. Describe the process that you will use to ensure that all persons assisting with the research are adequately informed about the protocol and their research-related duties and functions.

The principal investigator, Dr. Suzanne Ameringer, the PhD Candidate's Dissertation Chair, will oversee all aspects of the research by means of routine and as needed electronic or telephone communications with the student investigator.

The student investigator, Diana Cartagena, will be responsible for directly implementing all aspects of the study, including participant recruitment, data collection, and analysis. Mrs. Cartagena will meet monthly with the PI to discuss research progress and any issues. Dr. Ameringer and Mrs. Cartagena have completed CITI training.

III. CONFLICT OF INTEREST

Describe how the principal investigator and sub/co-investigators might benefit from the subject's participation in this project or completion of the project in general. Do not describe (1) academic recognition such as publications or (2) grant or contract based support of VCU salary commensurate with the professional effort required for the conduct of the project

This study will be the basis for the student's PhD dissertation. The investigators will not benefit from subjects participating in the study or completion of this project.

IV. RESOURCES

Briefly describe the resources committed to this project including: (1) time available to conduct and complete the research, (2) facilities where you will conduct the research, (3) availability of medical or psychological resources that participants might require as a consequence of the research (if applicable), and (4) financial support.

The student The student is in dissertation phase of her doctoral program and has 3 days per week to dedicate to the study. All data collection activities will take place at the Child Development Resources (CDR) of Williamsburg, the Virginia Department of Health: Special Supplemental Nutrition Program for Women, Children, and Infants (WIC) Peninsula and Virginia Beach offices, or the participant's home. Neither staff in each of the agencies will be engaged or responsible for any of the research activities. The student investigator is familiar with each agency and has contacted the agencies for formal approval to recruit study participants (See appendix for letters of support). The student investigator has the time to conduct and complete the research. The study design and questions do not require the need for medical or psychological resources. This study is supported by a grant from Sigma Theta Tau International Honor Society of Nursing Gamma Omega Chapter.

V. HYPOTHESIS

Briefly state the problem, background, importance of the research, and goals of the proposed project.

Childhood obesity remains a major public health problem in the United States (Ogden, Carroll, Curtin, Lamb, & Flegal, 2010). Despite federal, state, and community-based initiatives promoting healthy life styles among children and adolescents, obesity rates have not changed over the past 10 years (Ogden et al., 2010). Even more worrisome is that among infants the prevalence of obesity has nearly doubled (Ogden et al., 2010). Results of the 2007-8 National Health and Nutrition Examination Survey (NHANES), estimate that 9.5% of infants (birth-23 months of age) were obese or at $\geq 95^{\text{th}}$ percentile for weight-for-length (Ogden et al., 2010). In particular, Latino infants living in this country have disproportionate high obesity prevalence rates (12.5%) compared to African American (10.3%) or white infants (8.7%) (Ogden et al., 2010). These findings are important because longitudinal studies indicate that rapid weight gain during the first two years of life is associated with a greater risk of obesity during childhood and later in life (Nader et al., 2006; Owen, 2005; Stettler, Zemel, Kumanyika, & Stallings, 2002; Whitaker, 1997). Serious health consequences of obesity in children and adults include cardiovascular disease, hypertension, and Type 2 diabetes (AAP, 2003; Barlow, 2007), thus prevention efforts must begin early and be targeted to high-risk groups such as Latino infants.

Recent research findings show evidence of racial and ethnic differences of obesity risk factors in Latino infants. Some of these obesity risk factors present prenatally or early in childhood and include: (a) maternal gestational diabetes, (b) rapid weight gain in infancy, (c) introduction of solid foods before 4 months of age, (d) low rates of exclusive breastfeeding (Snethen, Hewitt, & Goretzke, 2007; Taveras, Gillman, Kleinman, Rich-Edwards, & Rifas-Shiman, 2010). Most recent research efforts have focused primarily on understanding factors that contribute to obesity among Latino toddlers, preschoolers, and older children, and point to the complex reality of this problem (Chaidez, Townsend, & Kaiser, 2011; Gomel & Zamora, 2007; Lindsay et al., 2011; Sussner, Lindsay, Greaney, & Peterson, 2008; Sussner, Lindsay, & Peterson, 2009; Whitaker & Orzol, 2006). While there is only very limited evidence demonstrating the issues surrounding obesity for Latino infants, it appears that Latina mothers are more likely to *overfeed* their infants in response to misinterpreted feeding cues such as infant crying or fussiness (Gross et al., 2010; Worobey, Islas Lopez, & Hoffman, 2008), demonstrate pressure-feeding styles (Gross et al., 2010), combine breast and formula feeding even when breast supply is appropriate (Bunik et al., 2006), and perceive chubbier babies as healthy babies (Higgins, 2000). These limited findings call for a more clear understanding of family dynamics, socioeconomic factors and cultural practices that must be considered when examining maternal feeding beliefs and practices and the complexity of factors that contribute to obesity in Latino infants (Kaufman & Karpati, 2007; Lindsay et al., 2011). Thus, the proposed study builds on previous research (Lindsay et al., 2011), and addresses a gap in the literature by further exploring the factors that contribute Latina mothers feeding decisions, and to what extent these

feeding decisions are determined by the socioeconomic context and cultural traditions within the family.

VI. SPECIFIC AIMS

Primary aims of this study are: a) describe the main maternal, infant, and food factors that may contribute to overfeeding practices in Latina mothers; b) examine the relationships among maternal, infant, and food factors and maternal feeding practices; and c) determine predictive factors associated with maternal feeding practices in Latina mothers. **Secondary aims are:** a) evaluate the relationships between maternal factors, infant factors, food factors, maternal feeding practices and infant growth; b) determine predictive factors associated with infant growth; and c) evaluate the relationship between maternal feeding practices and infant growth.

VII. BACKGROUND AND SIGNIFICANCE

Include information regarding pre-clinical and early human studies. Attach appropriate citations.

Latino infants are predominately more overweight compared to infants from other ethnic and racial groups. Although, empiric evidence is lacking to fully explain the reasons behind this serious health disparity, it appears that Latina mothers tend to overfeed their infants (Gomel & Zamora, 2007; Higgins, 2000; Kaufman, Deenadayalan, & Karpati, 2009; Kaufman & Karpati, 2007). *The purpose of this research is exploring the factors that contribute to Latina mothers feeding decisions, and to what extent these feeding decisions are determined by the socioeconomic context and cultural traditions within the family.*

Obesity prevalence.

Childhood obesity is a public health concern both in the US and abroad. Among children 5 years of age and younger approximately 43 million are overweight and obese, worldwide (WHO, 2010). According to the World Health Organization (WHO), children living in developing countries are more likely to be obese than those living in developed countries, 35 million and 8 million respectively (WHO, 2010). Results of the 2007-8 National Health and Nutrition Examination Survey (NHANES), estimate that among US children and adolescents 2- to 19-year-old, 31.7% exceeds the 85th percentile for body mass index (BMI) for age, and 16.9% exceeds the 95th percentile (Ogden et al., 2010). According to the same survey, an estimated 9.5% percent of infants (birth-23 months of age) are obese (weight for length \geq 95th percentile), a two fold increase in the past 10 years (Ogden et al., 2010). The NHANES results are of concern and indicate sustaining significant high BMI levels in US infants and children (Ogden et al., 2010).

Obesity is costly and leads to long-term consequences.

Longitudinal research studies have shown that childhood obesity trends begin early in life and persist into adolescence and adulthood (Nader et al., 2006; Owen, 2005; Stettler et al., 2002; Whitaker, 1997). Significant obesity related psychosocial co-morbidities such as depression and low self-esteem are often seen in children with resulting negative effects on peer relations and school performance (AAP, 2003; Barlow, 2007). Chronic and costly health consequences of obesity in children and adults include cardiovascular disease, hypertension, and Type 2 diabetes (AAP, 2003; Barlow, 2007). An estimated \$147 billion is the annual health care cost of obesity in the US (Finkelstein, Trogon, Cohen, & Dietz, 2009).

Ethnic disparities.

Obesity is a serious condition that affects a significantly higher number of Latino children and infants. Findings demonstrate that the likelihood of obesity increases among children from low-income, Spanish-speaking households, children of Hispanic ethnicity, and families participating in public insurance programs (Bethell, Simpson, Stumbo, Carle, & Gombojav, 2010). The prevalence of obesity among 2-19-year-old

Latino children is approximately 38.2% in comparison to 29.2% in White and 35.9% in African American children (Ogden et al., 2010). Even more worrisome, the obesity prevalence in Latino infants is approximately 12.5% (even higher in Latino males, 14.9%) in contrast to 10.3% in African American and 8.7% in white infants (Ogden et al., 2010). These findings demonstrate that Latino infants and children are disproportionately more obese than any other racial or ethnic groups in the US. Empiric evidence is lacking to fully explain the reasons for this health disparity. *Thus the proposed research study addresses a crucial area of disparities in health outcomes of Latino infants.*

Multifactor etiology.

The etiology of childhood obesity is believed to be complex and multifactorial. Genetic, environmental, cultural, social, economic, familial, and life style factors are believed to contribute to the current obesity epidemic (Birch & Davison, 2001). Familial patterns of obesity are commonly seen among Latino groups. Patterns of familial adiposity likely develop from the contribution of genetic predispositions and family environmental factors mutually influencing the growth trajectory of children (Birch & Davison, 2001). However, drastic increases in the prevalence of obesity in children and adults within the past 20 years (Ogden et al., 2010) points to environmental influences as major forces behind the development and chronicity of obesity (Birch & Davison, 2001). Further research is needed to clearly identify obesogenic environments that contribute to the development of familial resemblances in obesity (Birch & Davison, 2001). Parents of young children play a significant role in shaping the child's early experiences with food and eating (Birch & Davison, 2001; Lindsay et al., 2011). Children are more likely to develop eating habits modeled by their parents (Birch & Davison, 2001; Lindsay et al., 2011). The study of obesity among Latino infants must take into account the interplay of these complex family environments and parental behaviors, within the socioeconomic and cultural contexts of this ethnic group (Birch & Davison, 2001; Lindsay et al., 2011).

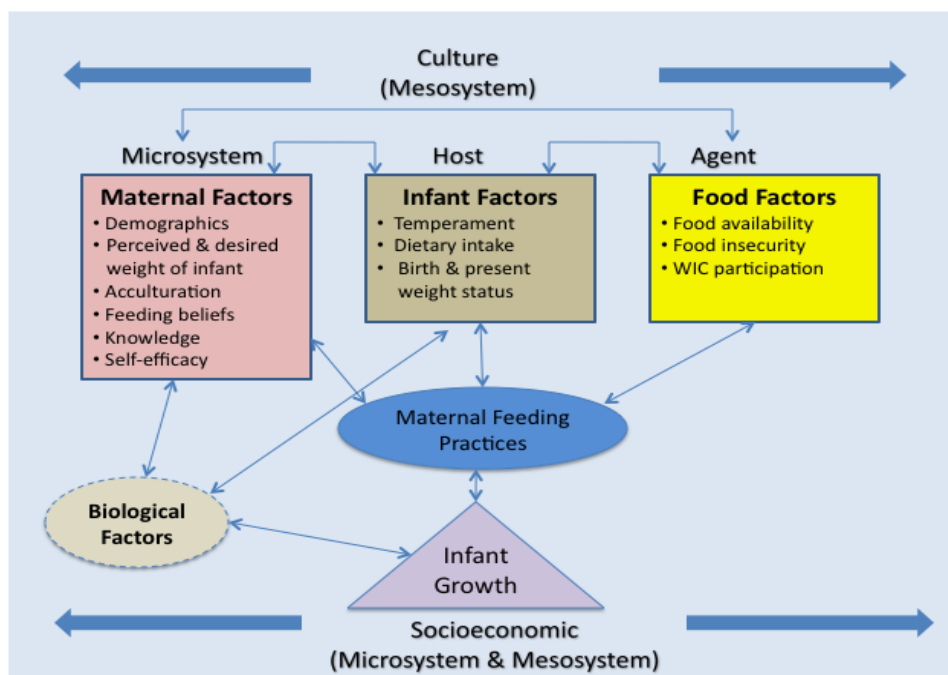
Conceptual Framework.

The Ecological model of growth (EMG) developed by Reifsnider (Reifsnider, Gallagher, & Forgione, 2005) is used in the proposed study to provide the conceptual framework for exploring the complex interplay of socioeconomic and cultural influences on maternal feeding decisions and practices that may lead to obesity in Latino infants. The EMG is a heuristic model that explains the levels of a child's environment that influences the child's growth (Reifsnider et al., 2005). Adapted from the ecology of human development, (Bronfenbrenner, 1979) epidemiology, and the child health assessment interaction model (Barnard et al., 1989), the EMG illustrates the influences at the host (child) and agent (food) levels as they interact with the environment (microsystem and mesosystem). The host variables are those characteristics of the child

such as temperament. Nutritional resources including food quality and quantity and feeding practices are seen as the agents of growth. The microsystem consists of the child's home environment and the parent-child interactions. The child's community outside the home makes up the mesosystem. In this EMG, the set of structures are interconnected and influencing each other within the model (Reifsnider et al., 2005).

In the proposed study, The EMG provides a comprehensive framework to explore the socioeconomic influences (microsystem and mesosystem) and cultural pathways (mesosystem) that determine maternal feeding decisions and practices and thus will inform the development of preventive interventions that are meaningful and appropriate to Latino families. For the purpose of this research, overfeeding in Latino infants is conceptualized within an adapted EMG framework consisting of the following components: maternal factors (demographics, actual and perceived weight status of self, perceived weight status of infant, acculturation, feeding beliefs, and knowledge and efficacy), infant's factors (temperament, dietary intake and actual weight status), food factors (food availability, food insecurity, and WIC participation). In the proposed model these factors are interrelated and placed within larger socioeconomic and cultural contextual factors [Figure]. At present, not enough empiric evidence is available to uncover which relationships are more significant in influencing or leading to infant overfeeding behaviors among Latina mothers.

Figure. Ecological Model of Growth



Socioeconomic Factors (mesosystem and exosystem).

Low-income children are at excess risk of obesity regardless of ethnicity, but ethnic differences in pediatric obesity are observed within lower-income levels (Anderson & Butcher, 2006; Whitaker & Orzol, 2006). Approximately 18.5% of Latino preschool children are obese compared to 12.6% White and 12.3% Asian children from low-income families (Sharma et al., 2009). According to the 2009 Pediatric Nutrition Surveillance System, 1 of 7 low-income preschool-aged children is obese (Polhamus, Dalenius, Mackintosh, Smith, & Grummer-Strawn, 2011). In general, except for African American girls, obesity in children typically declines as income and parental education increase (Kumanyika & Grier, 2006). In children from low-income households, specific measures of material resources maybe better at capturing meaningful short-term variability in economic resources than household annual income (Whitaker & Orzol, 2006). Household food insecurity may be a specific form of material deprivation that might influence diet quality and thereby obesity in children (Whitaker & Orzol, 2006). However, the relationship between food insecurity and childhood obesity is unclear (Kaiser et al., 2002; Whitaker & Orzol, 2006). A large study of preschool children from different ethnic and racial groups found no association between childhood obesity and food insecurity (Whitaker & Orzol, 2006).

Cultural Factors (macrosystem).

Culture is the learned shared knowledge, beliefs, and rules that people use to interpret experience and generate social behavior (Sorensen et al., 2003). Understanding cultural beliefs and values about weight, dietary habits, and physical activity is important prior to designing culturally sensitive preventive interventions (Ward, 2008). For example, Latino mothers often associate increased body weight with a sign of good health and have difficulty recognizing obesity in their children (Gomel & Zamora, 2007; Higgins, 2000; Kaufman et al., 2009; Reifsnider, Allan, & Percy, 2000a, 2000b; Reifsnider et al., 2006).

Cultural variations in parenting practices influence Latina mothers feeding patterns and practices. A study by Miller and Howard (2002) compared behavior patterns of Puerto Rican and Anglo mothers during infant feeding and play. They found Puerto Rican mothers were more likely to show patterns of beliefs and behaviors that emphasized the infant's interdependence on the mother. As an example, none of the Puerto Rican infants were primarily self-feeders at 12 months of age (Miller & Harwood, 2002). In other studies, Latina mothers identified infant crying as an indicator of hunger (Gross et al., 2010; Worobey et al., 2008), and believed that mothers should always make their babies finish their bottles (pressure feeding) (Gross et al., 2010). Limited evidence thus point to Latina mother's tendency to overfeed their infants. The proposed research study builds on previous research (Lindsay et al., 2011), and addresses a gap in the literature by further exploring the factors that contribute to overfeeding in Latina

mothers and may predispose infants to overweight.

Acculturation (microsystem).

Acculturation is the process of simultaneously adapting to certain aspects of a new culture while modifying aspects of the native culture (Sussner et al., 2008). A common measure of acculturation is the degree of acquired language proficiency from new culture (Marin & Gamba, 1996). Research suggests that maternal acculturation influences child weight status and feeding practices (Kaiser et al., 2002; Sussner et al., 2009). Maternal exclusive use of native language was associated with higher BMI in children as young as 24 months old (Sussner et al., 2009). In a study of Mexican-American mothers, less acculturated mothers were more likely to view bribes, threats, and punishment as effective feeding strategies (Kaiser et al., 2002). Studies of the relationship between acculturation and breastfeeding show that the longer a Latina mother lives in the US, the shorter the duration of exclusive breast feeding (Gorman, Madlensky, Jackson, Ganiats, & Boies, 2007), and the less likely she is to initiate breastfeeding (Perez-Escamilla et al., 1998). One exception was found in a study of Puerto Rican mothers for whom acculturation did not influence initiation or duration of breastfeeding (A. K. Anderson et al., 2004).

Infant Factors (host).

Behavioral characteristics of infants are readily apparent soon after birth. Temperament is defined as the infant's behavioral style and occurs in relation to the environment and caregiving (McGrath, Records, & Rice, 2008). A mother's perception of infant temperament shapes the quality of the relationship between the infant and mother, as well as further development of infant temperament characteristics (Mäntymaa, Puura, Luoma, Salmelin, & Tamminen, 2006). The perception of an infant's difficult or distressed behavior may contribute to the mother's initiation of caregiving activities such as feeding (Carey, 1985). Studies have revealed that "difficult" temperament, a broader concept which varies considerable from excessive fussing to crying (Slining, Adair, Goldman, Borja, & Bentley, 2009), is related to increased weight gain and body size in infancy (Carey, 1985; Darlington, 2006; Niegel, Ystrom, & Vollrath, 2007; Slining et al., 2009). These findings suggested that a fussy infant temperament might lead mothers to use food as a soothing technique (Carey, 1985; Darlington, 2006). Several studies have found that mothers use infant fussing or crying to determine when their infant is hungry or when to begin complementary feeding particularly solid foods (Baughcum et al., 2001; Heinig, 2005; Hodges, Hughes, Hopkinson, & Fisher, 2008). A study by Wasser and colleagues (Wasser et al., 2011), found that mothers who perceived their infants to be "fussy", were twice as likely to feed them solid foods before 6 months of age. The formula fed infants who received solids or juice consumed approximately 100 Kcal more than the infants who consumed only formula (Wasser et al., 2011).

Among Latina mothers, infant crying is commonly identified as an indicator of hunger or lack of satiety (Gross et al., 2010; Worobey et al., 2008), and often a reason to supplement breastfeeding with formula feeding (Higgins, 2000; Kaufman et al., 2009) or solid foods (Gomel & Zamora, 2007; Higgins, 2000). A recent study of predictors of infant feeding frequency by Mexican immigrant mothers found that the number of crying episodes was the only predictive factor of infant feeding (Gomel & Zamora, 2007; Worobey et al., 2008).

Maternal Factors (microsystem).

A study exploring the socioeconomic and cultural roots of childhood obesity among low-income Latino families found that food was an available source of gratification for parents and children (Kaufman & Karpati, 2007). Parents and grandparents believed feeding symbolizes nurturing and caring. Satisfying children's wants and needs was an important sign of good parenting but it often involved allowing unhealthy food choices and overfeeding (Kaufman & Karpati, 2007). This is consistent with others studies that have shown Latino mothers are more likely to be indulgent in their feeding style (Chaidez et al., 2011; Hughes et al., 2006). In the Latino culture, mothers often have been instructed that providing a generous amount of food to their children is equated with good parenting (Sussner et al., 2008). A study of English and Spanish-speaking Latina mothers found that only Spanish-speaking mothers associate feelings of love or enjoyment with food preparation (Gomel & Zamora, 2007). For immigrant mothers their feeding beliefs and practices are closely tied to their cultural traditions and personal experiences of poverty and food insecurity (Kaufman & Karpati, 2007). Parental identity and sense of accomplishment in Latina mothers result from their perceptions of their child's happiness (Kaufman & Karpati, 2007), and child's wellbeing often evidenced by their child's weight (Gomel & Zamora, 2007; Higgins, 2000; Kaufman & Karpati, 2007). Although research has been conducted on feeding beliefs of parents of older children, no extant literature reflects the feeding beliefs of low-income Latina mothers of infants. Rapid infant weight gain is one of the leading causes of childhood obesity (Snethen et al., 2007; Taveras et al., 2010), however, little is known about the processes that lead to rapid weight gain among this population. The results of this innovative study have great significance for addressing a leading health disparity in our nation. Thus the proposed study seeks to more completely understand and describe socioeconomic and culturally driven forces that guide Latina mothers feeding decision that contribute to *infant* overfeeding; an area when even less is known.

Overfeeding.

The WHO has identified breastfeeding as the normal feeding for infants and the growth of breastfed infants as the norm to which the growth of formula-fed infants should be compared (WHO, 2010). The American Academy of Pediatrics (AAP)

recommends exclusive breastfeeding during the first 6 months of life (AAP, 2006). Recent scientific findings on the benefits of breastfeeding in the prevention of obesity are contradictory (Harder, 2005; Kramer et al., 2008; Monasta et al., 2010; Owen, 2005). Potential benefits of breastfeeding may result from a better self-regulation of intake in breastfeeding compared to bottle-feeding infants (AAP, 2003). Immigrant mothers are more likely than US born mothers to breastfeed their infants (Gibson-Davis & Brooks-Gunn, 2006). However for each year that a Hispanic mother lives in the US, there is a 4% decrease in the odds of breastfeeding and a 3% decrease in the odds of breastfeeding at 6 months (Gibson-Davis & Brooks-Gunn, 2006). Hispanic women who plan to combine breastfeeding and formula feeding usually breastfed for shorter duration than those intending only to breastfeed (Gill, 2009; Gill, Reifsnider, Mann, Villarreal, & Tinkle, 2004). Although Latina mothers easily identify the benefits of breastfeeding, they often provide complimentary formula feeding for fear of their inability to keep their infants sated and well-nourished (Higgins, 2000; Kaufman et al., 2009). This supplemental feeding may be an aspect that leads to later obesity issues. A study of Puerto Rican families found that infant feedings far exceeded the nutritional requirements and often doubled the amount of formula recommended by the AAP (Higgins, 2000). Higgins (2002) found that for Puerto Ricans, overfeeding was experienced as a protective behavior for keeping the child healthy, well fed, and safe from illness or harm. In a recent study of Latino newborns 4-6 weeks old, 91% of the mothers were providing daily formula supplementation and approximately one-fourth of the mothers were giving water or tea to their infants on a daily basis (Wojcicki et al., 2011). Research studies suggest that partially breastfed and formula-fed infants consume 20% more total calories per day than do exclusively breastfed infants (Dewey, 2001; Haisma et al., 2003).

Body Mass Index (BMI).

BMI is considered an indirect measure of body fat. BMI is defined as the weight in kilograms divided by the square of the height in meters (kg/m^2) (CDC, 2009). For children 2-19 years, BMI is plotted on a gender-specific growth chart to obtain a percentile ranking. This ranking is referred to as BMI for age (CDC, 2009). Normal BMI in children is a BMI < 85th percentile, overweight is a BMI > 85th percentile and < 95th percentile, and obese is > 95th percentile BMI for age and gender (CDC, 2009). In children younger than 2 years, weight-for-length is the measure used to determine body mass (CDC, 2009; WHO, 2010). Weight-for-length in a child less than 2 years that is above the 95th percentile is considered overweight (WHO, 2010). No at-risk-for-overweight category (BMI 85th to 95th percentile) exists for weight-for-length (WHO, 2010).

VIII. PRELIMINARY PROGRESS/DATA REPORT

If available.

N/A

IX. RESEARCH METHOD AND DESIGN

Include a brief description of the project design including the setting in which the research will be conducted and procedures. If applicable, include a description of procedures being performed already for diagnostic or treatment purposes.

Design Overview: A two-group cross-sectional research design will be used with a sample of 90 immigrant Latina mothers and their infants. The methodology will encompass a quantitative approach to explore the theoretically associated variables in a cross-sectional, descriptive design.

Sample: Low-income mother-infant dyads of Latin origin will be included in the study. Low-income is defined as infant eligibility to receive food assistance through the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC). Recruitment will take place at the Child Development Resources (CDR) of Williamsburg and the Peninsula and Virginia Beach WIC offices. Latina mothers 18 years of age or older with a singleton infant between 4-12 months of age will be screened for inclusion in the study. A convenience sample of 45 Latina mothers with infant whose weight is $\leq 85^{\text{th}}$ percentile weight/length will be enrolled in Group 1. Concurrently, a second group will be recruited of 45 Latina mothers with infant whose weight is $> 85^{\text{th}}$ percentile weight/length in Group 2.

Eligibility criteria: a) Immigrant Latina mothers from Central, South America, or the Caribbean (consistent with our available population mothers will be asked to self-identify country of origin; b) Mothers 18 years of age or older with one infant aged anywhere from 4 to 12 months at time of enrollment; c) Infant fit anthropometric criteria for being appropriate-sized or obese, and d) Low-income mother-infant dyads as defined as infant eligible to receive food assistance through the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC).

Exclusion criteria: a) Infants with chronic illness, history of prematurity or low-birth weight or any other factor that may impact a child's growth as determined by parent or caseworker report; b) Multiple births.

Procedure: Nurses and caseworkers at the CDR and WIC offices will identify potential participants who meet the study criteria. The staff at both agencies will briefly introduce the study to potential participants, and they will ask permission to refer interested

individuals to the student investigator. If the student investigator is not present at the time of subject recruitment, interested individuals will be asked to provide their name and telephone number if they wish to be contacted by the investigator. The student investigator who is a native Spanish speaker will then approach potential participants. Spanish and English flyers describing the study, eligibility requirements, and contact information for the study will be available for participants. The informed consent will be available in Spanish and English. If the potential participant has low-literacy, oral presentation and explanation of the written informed consent form and information to be supplied will take place in the presence of an impartial witness to ensure the participant understands the nature and requirements of the study. The informed consent process will take place in a private area. The student investigator will provide an overview of the study, answer any questions and have the potential participant read the consent form. Participants will receive a copy of the signed consent form. Signed consent forms will be locked in a secure cabinet at the VCU School of nursing in an area separate from data storage. Once participants have given informed consent, they will be enrolled. Data collection will begin at least 30 minutes after enrollment to facilitate participation in the study during short visits to the service agencies. Interviews will take approximately 1 hour and 30 minutes to complete per subject and will take place at the CDR, WIC offices, or the participant's home, whichever the participant prefers. If study interview is not completed during the first visit, the participant will be asked to complete the interview in a second visit.

Measures: The following measures will be administered to participants in a private location of one of the service agencies (see the Appendix for hard copy) or the participant's home. The student investigator who guides the participant through the options will administer all the measures. The interviews will take approximately 1 hour and 30 minutes to complete. Participants who complete the interview will receive a compensation of \$20.00 gift card for their time and effort. See appendix B-G for copy of instruments. See table for summary of variables with corresponding measures.

Maternal Factors

1) Perceived weight status of infant

Baby Rating Scale (BRS). The BRS consists of a line drawing continuum of nine babies who differ in size from leanest to heaviest. The BRS will be used to measure maternal perception of infant's weight. The mothers will be asked to indicate where they perceive their infant to fall on the BRS (see Appendix B). Response options are nine babies ranging from 1 (leanest) up to 9 (heaviest), with higher scores indicating a heavier baby. The mean score will be used in data analysis. The scale has shown good reliability and validity in a number of studies comparing the responses of individuals to assess ideal

and acceptable body sizes of infants, children, and adults (Rand et al., 1997, Rand & White, 2000).

2) Acculturation

The Latina Mother Child Feeding Practices Questionnaire (LMCFPQ). A subscale from the Latina Mothers Child Feeding Practices Questionnaire (LMCFPQ) (Lindsay et al., 2011) will be used to measure acculturation. The LMCFPQ's subscale, 'about your culture,' will be used to measure level of maternal acculturation by language proficiency. The subscale consists of 7 items and measures language preference and proficiency (Marin, Sabogal, Marin, Otero-Sabogal, & Perez-Stable, 1987). Response options range from 1 to 5. Scores can range from 7 to 35, with lower scores indicating low acculturation level and preference for the Spanish language. The instrument provides a mean score of acculturation (see Appendix C). The scale's validity and reliability needs to be determined in future studies.

3) Feeding beliefs

The Infant Feeding Styles Questionnaire (IFSQ). The IFSQ is an instrument designed to measure maternal beliefs and approach to controlling her infant's feeding behaviors (Horodyski, et al., 2011). The instrument consists of two subscales: feeding beliefs and feeding behaviors. The IFSQ's first subscale on **feeding beliefs** will be used to measure maternal beliefs about infant feeding. The subscale consists of 16 items. Response options are scored as: 1-disagree, 2-slightly disagree, 3-neutral, 4-slightly agree, and 5-agree. Scores can range from 16 to 80, with higher scores indicating healthier feeding beliefs (some items are reversed scored). The subscale provides a mean score of feeding beliefs. The instrument was pretested and validated with 150 African American first-time mothers with children ≤ 2 years of age. Reliabilities range from .75 - .95 (Borja, Mendes, Bentley, Zimmer, & Adair, 2007). The IFSQ has been translated into Spanish and its validity and reliability is presently being determined in a large multi-state randomized longitudinal controlled trail that includes Latino infants (See Appendix D).

4) Knowledge and efficacy

Maternal Knowledge and Self-efficacy Scale (MKSES). The scale consists of 11 knowledge items (internal consistency of .73) and seven self-efficacy items (internal consistency of .94) (Horodyski, et al., 2011). **Maternal knowledge** will be measured using the MKSES **knowledge** subscale; response options are: 'Yes', 'No' or 'Don't know'. Scores can range from 0 to 11, with higher scores (Yes- 1 point and No- 0 points, exception #6 item needs to be reversed score), indicating greater knowledge. A summative maternal knowledge score will be used in the data analysis. **Maternal self-efficacy** will be measured using the MKSES **self-efficacy** subscale; response options are scored as: 1-very unsure, 2-unsure, 3-neutral, 4-sure, and 5-very sure. Scores can range

from 7 to 35, with higher scores indicating higher self-efficacy. The subscale provides a mean score of maternal self-efficacy. The MKSES has been used with lower income mothers of infants (Brophy-Herb, Silk, Horodyski, Olson, & Mercer, 2007). The scale has been translated into Spanish and its validity and reliability is presently being determined in a large multi-state randomized longitudinal controlled trial that includes Latino infants (See Appendix E).

5) Demographics

The Latina Mother Child Feeding Practices Questionnaire (LMCFPQ). The LMCFQ subscale, 'about you and your child,' will be used to measure maternal demographic information. The subscale consists of 20 items but only information related to age, country of birth, educational level, marital status, income, employment status, and number of people living at home will be included.

Infant Factors

1) Temperament

Pictorial Assessment of Temperament (PAT). The PAT is a 10-illustrated vignettes tool that requires the mother to select how she would categorize her infant's reaction to everyday situations as represented by drawings (Clarke-Stewart, Fitzpatrick, Allhusen, & Goldberg, 2000). The PAT will be used to measure infant's temperament. The response options are: Baby X (easy child) = 1, Baby Y (average or slow-to-warm-up child) = 2, and Baby Z (difficult child) = 3. The instrument provides a mean score of infant difficulty ranging from 1 to 3 (Clarke-Stewart et al., 2000). Scores can range from 10 to 30, with the higher score meaning more difficult temperament. The PAT has been shown to have convergent validity with more widely utilized temperament questionnaires and has been validated with at-risk infants (Worobey et al., 2008). The student investigator a native Spanish-speaker has translated the PAT into Spanish. An independent consultant back translated the tool into English (See Appendix F).

2) Dietary intake

Infant 24-hour dietary intake recall. Infant's caloric intake will be measured using information from the Infant Feeding Scale (IFS). The mothers will provide infant's dietary intake over past 24 hours. The data will be collected and analyzed using Food Processor (ESHA Research), a computer based software application composed of 50,000+ food items.

In the proposed study, **overfeeding** will be assessed based on the number of maternal reported breastfeeding episodes for infants exclusively breast-fed. For formula feeding infants and those already taking solids, the total daily calories will be analyzed from the 24-hour dietary intake recall. According to the AAP infants four months of age and older

should breastfeed approximately 8 times daily and formula feeding infants should consume approximately 28-32 ounces daily or 100-120 kcal/kg/day (AAP, 2006).

3) Actual weight status

The infant's actual weight and length status at birth and time of interview will be obtained from CDR or WIC records. If the service agency has not recently measured the infant's weight and length, the student investigator will obtain the measurements at the time of the interview. The infant's weight will be measured to the nearest 0.1 kg using an electronic scale with the infant wearing only a dry diaper. The infant's length will be measured with a length board to the nearest millimeter. The infant's weight-for-length at both points will be converted to z scores to allow group comparison by gender and age in months

Food Factors

Food availability and insecurity

The Latina Mother Child Feeding Practices Questionnaire (LMCFPQ). The LMCFPQ subscale, 'making ends meet,' will be used to measure food availability and insecurity in the home. The subscale consists of 6 items. The response options are grouped into two-stage approach, either as agree or disagree. Once participants select a response, they are guided to the next level (slightly agree/disagree or strongly agree/disagree). Items responses are scored as: 1- slightly agree, 2- highly agree, 3- slightly disagree, 4- highly disagree, 5- don't know, and 6- refuses to answer. Scores can range from 6 to 36, with lower scores indicating a higher level of food insecurity in the home. The subscale provides a mean score of food insecurity.

Maternal Feeding Practices

The Infant Feeding Scale (IFS). The IFS will be used to measure maternal **feeding practices** relating to what is fed to the infant, how often and where. The scale is an adaptation of the Harvard Food Frequency Scale for children (Suiter & Gardner, 1992). The IFS consists of two subscales: food frequency scale and feeding environment. The first subscale is a 27-item **food frequency scale**. It identifies foods and beverages consumed by the infant including number of times offered daily, average number of spoonfuls eaten, total food and liquid consumed in a 24-hour period, and frequency of foods eaten during a week (Horodyski, et al., 2011). The food frequency subscale response options range from: 1- 'rarely/never,' 2- '1-3 times per week' to 3- '4 or more times per week'. Scores can range from 27-81, with higher scores indicating a higher rate of healthier foods offered to infant (some items are reversed scored). A summative score of food frequency will be used in data analysis.

The second subscale consists of questions related to the **feeding environment** at

home. An eleven-item subscale includes questions such as: a) where the infant ate, b) what the infant was doing during meal times, c) whether the television was on, d) if the mother sat with the infant, e) what, if any, of the same foods did the mother eat, f) how frequently the infant was fed, g) when the infant was fed, and h) who fed the infant (Horodynski, et al., 2011). The response options are in a Likert scale ranging from: 1- hardly ever, 2- some of the time, 3- most of the time, to 4- almost all the time. Scores can range from 4 to 44, with higher scores indicating a healthier eating environment (some items are reversed scored). The summative score will be used in data analysis. The IFS validity and reliability is presently being determined in a large multi-state randomized longitudinal controlled trial that includes Latino infants (See Appendix G).

The Infant Feeding Styles Questionnaire (IFSQ). The IFSQ second subscale includes 44 **behavior** items (Horodynski, et al., 2011) that will be used to measure maternal **feeding style behaviors**. Response options are scored as: 1- never, 2- seldom, 3- half of the time, 4- most of the time, and 5- always. Scores can range from 44 to 220, with lower scores indicating healthy feeding behaviors (some items are reversed scored). A summative score of feeding behaviors will be used in data analysis.

The maternal feeding practices score will be calculated by summing the scores of the 2 subscales (IFS and IFSQ behavior subscale) and then calculating the mean score.

Infant Growth

Retrospective assessment of infants' growth trajectory to-date. A retrospective review of the infant's weight-for-length records from birth to time of interview will be used to assess patterns of growth and overweight trends. Copies of the infants' growth charts will be obtained from CDR or WIC records. For the purpose of this study, infants \leq 85th percentile will be categorized as normal-sized and infants $>$ 85th percentile will be categorized as overweight. The infant's weight-for-length at birth and time of interview will be converted to z scores to allow group comparison by gender and age in months.

Table. Summary of variables with corresponding measures

Variables	Measures
Mother	Measures
Demographics	<i>Latino Mothers Child Feeding Questionnaire (LMCFQ),</i>
Perceived weight status of infant	<i>Baby Rating Scale (BRS)</i>

Acculturation	<i>Latino Mothers Child Feeding Questionnaire (LMCFQ),</i>
Feeding beliefs	<i>Infant Feeding Styles Questionnaire (IFSQ)</i>
Knowledge & efficacy	<i>Maternal Knowledge and Self-efficacy Scale (MKSES)</i>
Infant	
Temperament	<i>Pictorial Assessment of Temperament (PAT)</i>
Dietary intake	<i>24-hour diet recall</i>
Actual weight	<i>CDR & WIC records</i>
Food	
Food availability and insecurity	<i>Latino Mothers Child Feeding Questionnaire (LMCFQ),</i>
Maternal Feeding Practices	<i>Infant Feeding Scale (IFS) and Infant Feeding Styles Questionnaire (IFSQ)</i>
Infant Growth	<i>Retrospective Review of Growth Chart CDR & WIC records</i>

X. PLAN FOR CONTROL OF INVESTIGATIONAL DRUGS, BIOLOGICS, AND DEVICES.

Investigational drugs and biologics: IF Investigational Drug Pharmacy Service (IDS) is not being used, attach the IDS confirmation of receipt of the management plan.

Investigational and humanitarian use devices (HUDs): Describe your plans for the control of investigational devices and HUDs including:

- (1) how you will maintain records of the product's delivery to the trial site, the inventory at the site, the use by each subject, and the return to the sponsor or alternative disposition of unused product(s);
- (2) plan for storing the investigational product(s)/ HUD as specified by the sponsor (if any) and in accordance with applicable regulatory requirements;
- (3) plan for ensuring that the investigational product(s)/HUDs are used only in accordance with the approved protocol; and
- (4) how you will ensure that each subject understands the correct use of the investigational

product(s)/HUDs (if applicable) and check that each subject is following the instructions properly (on an ongoing basis).

N/A

XI. DATA ANALYSIS PLAN

For investigator-initiated studies.

Both descriptive and inferential statistics will be calculated to address the aims of the study. Descriptive statistics, including measures of central tendency and dispersion, will be computed on all demographic data of the total sample and by group. Descriptive statistics will also describe 24-hour dietary intake results of the total sample and by group.

Analysis for Primary Aims.

a) Describe the main maternal, infant, and food factors that may contribute to overfeeding practices in Latina mothers. Descriptive statistics will be used to describe the factors, including calculating means, standard deviations, and ranges for continuous variables and counts with frequencies for categorical variables.

b) Examine the relationships among maternal, infant, and food factors and maternal feeding practices. Univariate and multiple linear regressions will be used to examine relationships between the predictive factors and maternal feeding practices (p-values will be used to examine the effect of each factor).

c) Determine predictive factors associated with maternal feeding practices in Latina mothers. Regression coefficients (β) and their standard error will be presented for significant predictive factors.

Analysis of Secondary Aims.

a) Evaluate the relationships between maternal factors, infant factors, food factors, maternal feeding practices and infant growth. Univariate and multiple logistic regressions will be used to evaluate relationships between the predictive factors and infant growth.

b) Determine predictive factors associated with infant growth. Odds ratios will be presented for direction and magnitude of relationship. The explanatory factors with p-value < 0.2 will be included in multiple analyses relationship when controlling for confounders. Effect modifiers and confounders for interesting factors will be evaluated.

c) Evaluate the relationship between maternal feeding practices and infant growth. Spearman rank correlation coefficients will be used to evaluate the magnitude of the relationship between maternal feeding practices and infant growth (Spearman rank correlation coefficients and their standard errors will be presented).

XII. DATA AND SAFETY MONITORING

- If the research involves greater than minimal risk and there is no provision made for data and safety monitoring by any sponsor, include a data and safety-monitoring plan that is suitable for the level of risk to be faced by subjects and the nature of the research involved.
- If the research involves greater than minimal risk, and there is a provision made for data and safety monitoring by any sponsor, describe the sponsor's plan.
- If you are serving as a Sponsor-Investigator, identify the Contract Research Organization (CRO) that you will be using and describe the provisions made for data and safety monitoring by the CRO. Guidance on additional requirements for Sponsor-Investigators is available at <http://www.research.vcu.edu/irb/wpp/flash/X-2.htm>

N/A

XIII. MULTI-CENTER STUDIES

If VCU is the lead site in a multi-center project or the VCU PI is the lead investigator in a multi-center project, describe the plan for management of information that may be relevant to the protection of subjects, such as reporting of unexpected problems, project modifications, and interim results.

N/A

XIV. INVOLVEMENT OF NON-VCU INSTITUTIONS/SITES (DOMESTIC AND FOREIGN)

1. Provide the following information for each non-VCU institution/site (domestic and foreign) that has agreed to participate (all non-VCU institutions/sites are to be listed, including those who obtain local IRB approval from their own institution and those who request deferral to the VCU IRB):
 - Name of institution/site
 - Contact information for institution/site
 - Engaged in Research or not (if YES AND the research involves a DIRECT FEDERAL AWARD made to VCU, include FWA #). See OHRP's guidance on "Engagement of Institutions in Research" at <http://www.hhs.gov/ohrp/policy/engage08.html>.
 - Request for the VCU IRB to review on behalf of the Non-VCU institution? Submit either the template Authorization Agreement or Individual Investigator Agreement with this application. See additional requirements found at <http://www.research.vcu.edu/irb/wpp/flash/XVII-6.htm>.
 - See VCU WPPs:
<http://www.research.vcu.edu/irb/wpp/flash/XVII-6.htm> and
<http://www.research.vcu.edu/irb/wpp/flash/XVII-11.htm>.

Name of Institution	Contact Information for Site	Engaged (Y/N) and FWA # if applicable	Request for VCU IRB to review on behalf of the non-VCU institution (Y/N)*
Virginia Department of Health-Peninsula WIC Virginia Beach WIC	Verna Beckford	No	No
	Lisa Anderson	No	No
Child Development Resources of Williamsburg	Adrienne Frank	No	No

*NOTE: If a Non-VCU site is engaged in the research, the site is obligated to obtain IRB review or request that the VCU IRB review on its behalf.

2. Provide a description of each institution's role (whether engaged or not) in the research, adequacy of the facility (in order to ensure participant safety in the case of an unanticipated emergency), responsibilities of its agents/employees, and oversight that you will be providing in order to ensure adequate and ongoing protection of the human subjects. You should only identify institutions that have agreed to participate. If additional institutions agree to participate at a later time, they must be added by amendment to the protocol.

Virginia Department of Health-Peninsula and Virginia Beach WIC offices and Child Development Resources of Williamsburg are the settings for recruitment and data collection for this research. The Virginia Department of Health (VDH) requires separate IRB approval and the student investigator will concurrently seek IRB approval from this agency. The student investigator will be responsible for all onsite study activities.

XV. HUMAN SUBJECTS INSTRUCTIONS

ALL sections of the Human Subjects Instructions must be completed with the exception of the section entitled "Special Consent Provisions." Complete that section if applicable.

A. DESCRIPTION

Provide a detailed description of the proposed involvement of human subjects or their private identifiable data.

Participant mothers will be interviewed either in their homes or at a private location at one of the agencies, whichever they prefer. Data collection will take approximate 1 hour and 30 minutes to complete per subject. If study interviews are not completed during the first visit, participants will be asked to complete interviews during a second visit.

Research data will consist of questionnaire and interview data, and the infant's weight and height measurements as well as previous 24-hour recall of infant's diet. Only infant's growth records data are identified by patient name; and will be de-identified in the research database. Only the recorded growth data are pre-existing and will be collected and protected according to the HIPPA guidelines. All other research data will be collected and de-identified with code numbers. All research data will be kept in locked file cabinets in a secure research office on the third floor of the VCU School of Nursing. Code numbers are kept in a locked file in a separate location. Those who will have access to the information include the PI and student investigator.

B. SUBJECT POPULATION

Describe the subject population in terms of sex, race, ethnicity, age, etc., and your access to the population that will allow recruitment of the necessary number of participants. Identify the criteria for inclusion or exclusion of all targeted populations and include a justification for any exclusions. Explain the rationale for the involvement of special cases of subjects, such as children, pregnant women, human fetuses, neonates, prisoners or others who are likely to be vulnerable. If you plan to allow for the enrollment of Wards of the State (or any other agency, institution, or entity), you must specifically request their inclusion and follow guidance in VCU IRB WPP XV-3: Wards and Emancipated Minors available at <http://www.research.vcu.edu/irb/wpp/flash/XV-3.htm>.

A total of up to 90 Latina mothers and their children will be recruited to comprise the sample for the proposed study. Recruitment will occur at the Child Development Resources (CDR) of Williamsburg and the Peninsula and Virginia Beach WIC offices. In the Williamsburg, Peninsula and Virginia Beach areas, more than 95% of the Latina mothers are immigrants from Central America. A convenience sample of 45 Latina mothers with infant who's weight is < 85th percentile for weight/length will be enrolled in Group 1. Concurrently, a second group of 45 Latina mothers with infant whose weight is greater \geq 85th percentile for weight/length will be recruited and enrolled in Group 2.

Eligibility criteria include: a) Immigrant Latina mothers from Central, South America, or the Caribbean (consistent with our available population mothers will be asked to self-identify country of origin); b) Mothers 18 years of age or older with one infant aged anywhere from 4 to 12 months at time of enrollment; c) Infant fit anthropometric criteria for being appropriate-sized or obese, and d) Infant eligible to receive food assistance through the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC). To qualify for WIC, the household income is at 185% US federal poverty level or lower. WIC is a program funded by the U.S. Department of Agriculture for low-income women, infants, and children up to 5 years considered at nutritional risk. The program provides supplemental foods, education on healthy eating, and referrals to health care (IOM, 2006).

Exclusion criteria include: a) Infants with chronic illness, history of prematurity or low-birth weight or any other factor that may impact a child's growth as determined by parent or caseworker report; b) Multiple births.

This study population includes women of childbearing age and as such pregnant women will be included in the study sample.

C. RESEARCH MATERIAL

Identify the sources of research material obtained from individually identifiable living human subjects in the form of specimens, records, or data. Indicate whether the material or data will be obtained specifically for research purposes or whether use will be made of existing specimens, records, or data.

Research materials will consist of questionnaire and interview data, and the infant's weight and height records as well as previous 24-hour dietary recall data. All collected data will be obtained specifically for research purposes.

D. RECRUITMENT PLAN

Describe in detail your plans for the recruitment of subjects including:

- (1) how potential subjects will be identified (e.g., school personnel, health care professionals, etc),
- (2) how you will get the names and contact information for potential subjects, and
- (3) who will make initial contact with these individuals (if relevant) and how that contact will be done.

If you plan to involve special cases of subjects, such as children, pregnant women, human fetuses, neonates, prisoners or others who are likely to be vulnerable, describe any special recruitment procedures for these populations.

- (1) Nurses, caseworkers and translators at the CDR and WIC offices will identify potential participants who meet the study criteria. Spanish and English fliers describing the study, eligibility requirements, and contact information for the study will be available for potential participants.
- (2) The staff at both agencies will briefly introduce the study to potential participants and will ask permission to refer interested individuals to the student investigator. If the student investigator is not present at the time of subject recruitment, the staff at the CDR and WIC offices will facilitate a sign-up list where interested participants can provide contact information if they wish to be contacted by the investigator. This recruitment method is necessary to increase potential participant pool since these families are unlikely to initiate contact with the investigator by themselves. The potential participant contact information will be collected at the service agency in a sealed collection box that will be picked up twice a week by the student investigator.
- (3) CDR and WIC staff will do initial contact with participants in person or by telephone, except in cases when the student investigator has prior knowledge of the family as their infant's primary care provider.

E. PRIVACY OF PARTICIPANTS

NOTE: Privacy refers to individuals and their interests in controlling access to their identities, their physical person, and how and what kind of information is obtained about them. Privacy also encompasses the interests of defined communities (e.g. those with a certain diagnosis or social circumstance) in controlling access to the group identity and information about the group or individuals as part of the group.

Describe how the privacy interests of subjects (and communities, if appropriate) will be protected including:

- (1) In the research setting (e.g., in the identification, recruitment, and intervention settings) and
- (2) With the information being sought and the way it is sought. For example, providing drapes or barriers, interviewing in a private room, and collecting only the amount of

sensitive information needed for identification, recruitment, or the conduct of the study.

Study personnel are highly trained in research procedures and in issues regarding the protection of research subjects' rights and privacy. All members of the research team have completed VCU-mandated human subject training. Participants' identities will be protected via locking of consent forms with all identifying information in a separate location from data storage. Access to locked files will be restricted to the PI and student researcher. In addition to locked consent/identification files, all data files will be coded in a manner that makes identification of the participants unlikely. Participants' identification codes are simply their numerical enrollment into the study and thus do not lend themselves to inadvertent or unauthorized identification of participants. The locked locations have three additional levels of security in that the whole building, the floor, and the office in which the locked records are maintained have restricted or keyed access. The anonymous codes assigned to participants will be verified and maintained by the student researcher throughout the study and codes with names will be provided only to meet Federal guidelines applicable to the facility.

Data collection will take place in a private location of one of the agencies or the participant's home. All collected information will be for study purposes only.

F. CONFIDENTIALITY OF DATA

NOTE: Confidentiality refers to the way private, identifiable information about a subject or defined community is maintained and shared.

Check all of the following precautions that will be used to maintain the confidentiality of identifiable information:

☒ Paper-based records will be kept in secure location and only accessed by authorized study personnel

☒ Electronic records will be made available only to those personnel in the study through the use of access controls and encryption

☒ Identifiers will be removed from study-related data (data is coded with a key stored in a separate secure location)

☐ For research involving web-based surveys, data is secured via passwords and encryption

☐ Audio or video recordings of subjects will be transcribed and then destroyed to prevent audio or visual identification. Note the date of destruction (e.g., 3 months from close of study; after transcription is determined to be error free).

☐ Obtaining a Certificate of Confidentiality

☐ Other precautions:

G. POTENTIAL RISKS

Describe potential risks (physical, psychological, social, legal, or other) and assess their likelihood and seriousness. Where appropriate, describe alternative treatments and procedures that might be advantageous to the subjects.

There are no more than minimal physical and psychological risks associated with participation in this study. No sensitive data is being collected and there are no invasive procedures. Participants may elect to not participate and may withdraw during any point of the data collection period without affecting the care they receive by the agencies. The nature of this study minimizes risks to the mother and her baby.

H. RISK REDUCTION

Describe procedures for protecting against or minimizing potential risk. Where appropriate, discuss provisions for ensuring necessary medical or professional intervention in the event of adverse events to the subjects. Describe the provisions for monitoring the data collected to ensure the safety of subjects, if any.

The nature of the questions is not sensitive and unlikely to cause stress or anxiety for participants. Any concerns related to mother or infant well-being identified during data collection would be shared with the caseworkers at the respective service agency. Every effort to protect the privacy and ensure a positive experience during the data collection will be made.

All research data will be kept in locked file cabinets in a secure research office on the third floor of the VCU School of Nursing. Code numbers are kept in a locked file in a separate location. Those who will have access to the information include the PI and student researcher.

I. ADDITIONAL SAFEGUARDS FOR VULNERABLE PARTICIPANTS

Describe any additional safeguards to protect the rights and welfare of participants if you plan to involve special cases of subjects such as children, pregnant women, human fetuses, neonates, prisoners or others who are likely to be vulnerable.

Safeguards to protect the rights and welfare of participants might relate to Inclusion/Exclusion Criteria: ("Adults with moderate to severe cognitive impairment will be excluded." "Children must have diabetes. No normal controls who are children will be used.") Consent: ("Participants must have an adult care giver who agrees to the participant taking part in the research and will make sure the participant complies with research procedures." "Adults must be able to assent. Any dissent by the participant will end the research procedures.") Benefit: ("Individuals who have not shown benefit to this type of drug in the past will be excluded.").

N/A

J. RISK/BENEFIT

Discuss why the risks to participants are reasonable in relation to the anticipated benefits to subjects and in relation to the importance of the knowledge that may reasonably be expected to result. If a test article (investigational new drug, device, or biologic) is involved, name the test article and supply the FDA approval letter.

There are minimal physical and psychological risks associated with participation in this study. There are no potential benefits of the study to individual participants. Participation could heighten awareness about maternal feeding beliefs and practices but are unlikely to lead to change in behaviors by the participants. The findings will be used to inform future development of targeted preventive interventions that will improve the overall health and wellbeing of Latino infants and their families; and successfully bring about health behavior change in this vulnerable ethnic group.

K. COMPENSATION PLAN

Compensation for participants (if applicable) should be described, including possible total compensation, pro-rating, any proposed bonus, and any proposed reductions or penalties for not completing the project.

Participants will receive compensation for their time and effort in the amount of \$20.00 gift card upon completion of interview.

L. CONSENT ISSUES

1. CONSENT PROCESS

Indicate who will be asked to provide consent/assent, who will obtain consent/assent, what language (e.g., English, Spanish) will be used by those obtaining consent/assent, where and when will consent/assent be obtained, what steps will be taken to minimize the possibility of coercion or undue influence, and how much time will subjects be afforded to make a decision to participate.

The student investigator who is a native Spanish speaker will approach prospective participants. Participants will be fully informed of study procedures, risks, and benefits. The student investigator will obtain the written consent. The informed consent will be available in Spanish and English whichever the participant chooses. If the potential participant has low-literacy, oral presentation and explanation of the written informed consent form will take place in the presence of an impartial witness to ensure the

participant understands the nature and requirements of the study. The informed consent process will take place in a private area of the CDR or WIC offices. The student investigator will provide an overview of the study, answer any questions and have the potential participant read the consent form. Participants will receive a copy of the signed consent form.

2. SPECIAL CONSENT PROVISIONS

If some or all subjects will be cognitively impaired, or have language/hearing difficulties, describe how capacity for consent will be determined. Consider using the VCU Informed Consent Evaluation Instrument available at <http://www.research.vcu.edu/irb/guidance.htm>. If you anticipate the need to obtain informed consent from legally authorized representatives (LARs), please describe how you will identify an appropriate representative and ensure that their consent is obtained. Guidance on LAR is available at <http://www.research.vcu.edu/irb/wpp/flash/XI-3.htm>.

N/A

3. ASSENT PROCESS

If applicable, explain the Assent Process for children or decisionally impaired subjects. Describe the procedures, if any, for re-consenting children upon attainment of adulthood. Describe procedures, if any, for consenting subjects who are no longer decisionally impaired. Guidance is available at <http://www.research.vcu.edu/irb/wpp/flash/XV-2.htm> and <http://www.research.vcu.edu/irb/wpp/flash/XVII-7.htm>.

N/A

4. REQUESTS FOR WAIVERS OF CONSENT (COMPLETE IF REQUESTING ANY TYPE OF WAIVER OF CONSENT OR ASSENT)

4-A. REQUEST TO WAIVE SOME OR ALL ELEMENTS OF INFORMED CONSENT FROM SUBJECTS OR PERMISSION FROM PARENTS: A waiver of informed consent means that the IRB is not requiring the investigator to obtain informed consent OR the IRB approves a consent form that does not include or alters some/all of the required elements of consent. **Guidance is available at <http://www.research.vcu.edu/irb/wpp/flash/XI-1.htm>. NOTE:** Waiver is not allowed for FDA-regulated research unless it meets FDA requirements for Waiver of Consent for Emergency Research (see below).

4-A.1. Explain why a waiver or alteration of informed consent is being requested.

4-A.2. Describe how this study meets ALL FOUR of the following conditions for a waiver or alteration:

- The research involves no more than minimal risk to the participants. → Explain how your study meets this criteria:
- The waiver or alteration will not adversely affect the rights and welfare of participants. → Explain how your study meets this criteria:
- The research could not practicably be carried out without the waiver or alteration. → Explain how your study meets this criteria:
- Will participants be provided with additional pertinent information after participation?
☐ Yes
☐ No → Explain why not:

4-B. REQUEST TO WAIVE DOCUMENTATION OF CONSENT: A waiver of documentation occurs when the consent process occurs but participants are not required to sign the consent form. Guidance is available at <http://www.research.vcu.edu/irb/wpp/flash/XI-2.htm> . One of the following two conditions must be met to allow for consenting without signed documentation. Choose which condition is applicable and explain why (explanation required):

☐ The only record linking the participant and the research would be the informed consent form. The principal risk to the participant is the potential harm resulting from a breach of confidentiality. Each participant will be asked whether he/she wants documentation linking the participant with the research and the participants wishes will govern. → Explain how your study fits into the category:

☐ The research presents no more than minimal risk of harm to participants & involves no procedures for which signed consent is normally required outside of the research context. → Explain how your study fits into the category:

4-C. REQUEST TO WAIVE SOME OR ALL ELEMENTS OF ASSENT FROM CHILDREN ≥ AGE 7 OR FROM DECISIONALLY IMPAIRED INDIVIDUALS: A waiver of assent means that the IRB is not requiring the investigator to obtain assent OR the IRB approves an assent form that does not include some/all of the required elements. Guidance is available at <http://www.research.vcu.edu/irb/wpp/flash/XV-2.htm>.

4-C.1. Explain why a waiver or alteration of informed consent is being requested.

In order for the IRB to approve a request for waiver of assent, the conditions for 4-C.2, 4-C.3,

OR 4-C.4 must be met. Check which ONE applies and explain all required justifications.

4-C.2. ☐ Some or all of the individuals age 7 or higher will not be capable of providing assent based on their developmental status or impact of illness. → Explain how your study meets this criteria:

4-C.3. ☐ The research holds out a prospect of direct benefit not available outside of the research. → Explain how your study meets this criteria:

4-C.4. ☐ Describe how this study meets ALL FOUR of the following conditions:

- The research involves no more than minimal risk to the participants. → Explain how your study meets this criteria:
- The waiver or alteration will not adversely affect the rights and welfare of participants. → Explain how your study meets this criteria:
- The research could not practicably be carried out without the waiver or alteration. → Explain how your study meets this criteria:
- Will participants be provided with additional pertinent information after participation?
☐ Yes
☐ No → Explain why not:

4-D. REQUEST TO WAIVE CONSENT FOR EMERGENCY RESEARCH: Describe how the study meets the criteria for emergency research and the process for obtaining LAR consent is appropriate. See guidance at <http://www.research.vcu.edu/irb/wpp/flash/XVII-16.htm>.

N/A

5. GENETIC TESTING

If applicable, address the following issues related to Genetic Testing.

5-A. FUTURE CONTACT CONCERNING FURTHER GENETIC TESTING RESEARCH

Describe the circumstances under which the subject might be contacted in the future concerning further participation in this or related genetic testing research.

N/A

5-B. FUTURE CONTACT CONCERNING GENETIC TESTING RESULTS

If planned or possible future genetic testing results are unlikely to have clinical implications, then a statement that the results will not be made available to subjects may be appropriate. If results might be of clinical significance, then describe the circumstances and procedures by which subjects would receive results. Describe how subjects might access genetic

counseling for assistance in understanding the implications of genetic testing results, and whether this might involve costs to subjects. Investigators should be aware that federal regulations, in general, require that testing results used in clinical management must have been obtained in a CLIA-certified laboratory.

N/A

5-C. WITHDRAWAL OF GENETIC TESTING CONSENT

Describe whether and how subjects might, in the future, request to have test results and/or samples withdrawn in order to prevent further analysis, reporting, and/or testing.

N/A

5-D. GENETIC TESTING INVOLVING CHILDREN OR DECISIONALLY IMPAIRED PARTICIPANTS

Describe procedures, if any, for consenting children upon the attainment of adulthood. Describe procedures, if any, for consenting participants who are no longer decisionally impaired.

N/A

5-E. CONFIDENTIALITY OF GENETIC INFORMATION

Describe the extent to which genetic testing results will remain confidential and special precautions, if any, to protect confidentiality.

N/A

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Chapter 4 – Dissertation Manuscript

Factors Contributing to Infant Feeding Practices with Latina Mothers

Childhood obesity remains one of the most serious and common health issues affecting millions of children in the United States (U.S.). The statistics are sober as approximately 12.5 million (17%) of children and adolescents aged 2-19 years are obese (Ogden, Carroll, Kit, & Flegal, 2012). Among infants and toddlers, birth to two years of age, the prevalence of obesity has nearly doubled in the past three decades. Further, obesity is a particular health concern for Hispanic infants and children living in the U. S. From 1999 to 2010, Hispanic infants persistently showed higher obesity prevalence rates (14.8%) compared to black (8.7%) and white infants (8.4%) (Ogden et al., 2012). These trends are concerning because longitudinal studies indicate that rapid weight gain during the first two years of life is associated with an increased risk of obesity in children and adults (Nader et al., 2006; Owen, 2005; Stettler, Zemel, Kumanyika, & Stallings, 2002; Whitaker, 1997).

Obesity in children is associated with adverse effects on quality of life, school performance and interpersonal relationships, as well as on self-esteem and mood. Health consequences of obesity in children and adolescents include cardiovascular disease, hypertension, and Type 2 diabetes (American Academy of Pediatrics (AAP), 2003; Barlow, 2007). Evidence has shown that obese children as young as three years old have inflammatory biomarkers that are associated with a risk for developing heart disease later in life (Skinner, Steiner, & Henderson, 2010). According to a recent report by the Centers for Disease Control and Prevention (CDC) (2011),

one in three children who were born in 2000 will develop diabetes in their lifetime. More strikingly, Hispanic children are 1.5 times more prone than whites to develop the disease. Obesity in Hispanic youth is potentially contributing to an increase incidence of Type 2 diabetes in this group of adolescents (AAP, 2003). Thus, obesity prevention efforts must begin early in life and be targeted to high-risk groups such as Latino infants.

The term Hispanic is used interchangeable with Latino and refers to a heterogeneous ethnic group of people with origins in the regions of Central America, including the Caribbean, South America, and other Spanish-speaking countries (Flores, 2002). The term Latino was the preferred one for this study. The Hispanic population of the U.S. is approximately 53 million and constitutes 17% of the total U.S. population. An estimated 23% of Hispanics living in the U.S. are 17 years and under (over 17 million), which is a 39% increase in the last 10 years (U.S. Census Bureau, 2010). As the Hispanic population in the U.S. continues to grow, the obesity epidemic may increase as well, especially among young children and adolescents.

Literature Review

Recent research efforts have focused primarily on understanding factors that lead to obesity among Latino preschoolers and older children, and have revealed the complexity of this problem. Little is known about the factors that contribute to rapid weight gain in Latino infants. Studies of Latina mothers indicate that their feeding beliefs and practices are likely to promote infant overfeeding and may explain the high infant overweight rates often seen among this ethnic group. Findings from observational studies of formula fed infants show higher intakes of formula and other sources of energy to be positively associated with infant weight gain and

childhood body mass index (BMI) (Ong, Emmett, Noble, Ness, & Dunger, 2006). Overfeeding is defined as “feeding behaviors that lead to an energy intake for the infant that exceeds the requirements for normal growth and development” (Cartagena et al., 2014, p. 140).

Several factors may influence maternal feeding decisions and practices possibly resulting in infant overfeeding. Research on breastfeeding and formula feeding beliefs, attitudes, and practices of Latina mothers point out some of the factors leading to infant feeding differences among these mothers. Latina mothers are more likely to initiate breastfeeding but less likely to practice exclusive breastfeeding than white or black mothers (CDC, 2013). The most common reason given by Latinas for non-exclusive breastfeeding is fear of having an inadequate milk supply (Higgins, 2000; Kaufman, Deenadayalan, & Karpati, 2009). Another important factor contributing to non-exclusive breastfeeding practices in Latinas is the maternal belief that a combination of breast milk and formula feeding is best for the infant (Bartick & Reyes, 2012; Bunik et al., 2006). Unnecessary supplementation with formula and other unhealthy feeding practices, such as early introduction of solids and ethnic foods, often result from advice of well-intended and influential family members (Bunik et al., 2006). Another factor contributing to feeding differences among Latinas is a common cultural belief that a heavy baby is a healthy baby (Bunik et al., 2006; Higgins, 2000; Kaufman & Karpati, 2007). Bunik and colleagues (2006) reported that Hispanic mothers often receive advice and pressure from family members and fathers to supplement breast milk with formula if the infants were fussy or not *gordito* (chubby).

Infancy is a critical period of unique development and plasticity. Mothers play a crucial role in modeling and shaping their infants eating habits and food preferences (Anzman, Rollins, & Birch, 2010). Thus, the family feeding environment and maternal feeding practices determine the infant's eating behaviors that have lifelong lasting health effects. Rapid weight gain in infancy is associated with an increased risk of obesity in children and adults. Maternal overfeeding practices appear to be linked to the higher obesity rates observed in Latino infants. Therefore, obesity prevention and intervention efforts must begin early in life and be targeted to high-risk groups like Latinos. The purpose of this study was to describe maternal, infant, and food factors contributing to infant feeding practices of Latina mothers using an Ecological Model of Growth. In addition, the association between maternal, infant, and food factors, and maternal feeding practices as well as infant weight gain was evaluated.

Conceptual Framework

The Ecological Model of Growth (EMG) developed by Reifsnider and colleagues (Reifsnider, Gallagher, & Forgione, 2005) was adapted to provide the conceptual framework for exploring the complex interplay of socioeconomic and cultural influences on maternal feeding decisions and practices that may lead to obesity in Latino infants. The EMG is a heuristic model which suggests that environmental factors can influence a child's growth (Reifsnider et al., 2005). In this model, the factors at the host (child) and agent (food) levels interact with the environment (microsystem and mesosystem). The host variables are those characteristics of the child such as temperament. The agents of growth are the nutritional resources including food quality and quantity. The microsystem environment consists of the child's home environment

and the parent-child interactions. The mesosystem environment consists of the child's community outside the home.

In the adapted EMG framework the maternal, child and host factors are interrelated and placed within larger socioeconomic and cultural contextual factors (See Figure). At present, not enough empiric evidence is available to uncover which factors are the strongest predictors of infant overfeeding behaviors among Latina mothers. Below is an overview of the factors in the model.

Maternal Factors. There are a number of maternal factors that influence the feeding practices of Latina mothers and possibly contributing to the weight gain of their infants. Factors such as maternal age, education, and socioeconomic status as well as her level of acculturation appear to determine the feeding decisions among this group of mothers. Other factors such as maternal feeding beliefs, basic knowledge and understanding about infant feeding, and level of comfort or self-efficacy with feedings tasks, may also contribute to some of the differences in their feeding practices. Maternal perception of infant's weight status has shown to be one of the most important factors influencing the feeding practices and potentially the rapid weight gain often seen in Latino infants.

Research suggests that maternal acculturation influences feeding practices and weight gain in young children (Kaiser et al., 2002; Sussner, Lindsay, & Peterson, 2009). Acculturation is the process of simultaneously adapting to certain aspects of a new culture while modifying aspects of the native culture (Sussner, Lindsay, Greaney, & Peterson, 2008). Common measures of acculturation include the degree of acquired language proficiency from the adopted culture

(Marin & Gamba, 1996), or using a proxy such as years of U.S. residence. Maternal exclusive use of native language has been associated with higher BMI in children as young as 24 months old (Sussner et al., 2009). In a study of Mexican-American mothers, less acculturated mothers were more likely to use bribes, threats, and punishment as effective feeding strategies (Kaiser et al., 2002). In contrast, studies of the relationship between acculturation and breastfeeding show that the longer a Latina mother lives in the US, the shorter the duration of exclusive breastfeeding (Gorman, Madlensky, Jackson, Ganiats, & Boies, 2007), and the less likely she is to initiate breastfeeding (Perez-Escamilla et al., 1998). Discrepancies in findings from these studies point to the fact that a more comprehensive and reliable measure of acculturations is needed (Beck, 2006) to determine its impact on feedings practices of Latinas and the resulting influence on infant's weight gain.

For reasons that are unclear, Latina mothers are more likely to initiate breastfeeding but less likely to practice exclusive breastfeeding than white or black mothers. Favorable beliefs about combining breast milk and formula feeding (CBFF) may contribute to very low rates of exclusive breastfeeding. Many Latina mothers recognize the benefits of breastfeeding, however they often provide complimentary formula feeding for fear of their inability to keep their infants sated and well-nourished (Higgins, 2000; Kaufman et al., 2009; Li, Fein, Chen, & Grummer-Strawn, 2008; McCann, Baydar, & Williams, 2007). Other Latinas believe CBFF is best for the infant because of the benefits of breast milk and the vitamins and nutrients present in formula (Bunik et al., 2006).

Latina mothers' beliefs and practices about infant feeding are determined in part by cultural traditions that shape family influences. For example, in a study by Bunik and colleagues (2006), Latina mothers expressed or held the same beliefs of older family members that a chubby infant is healthier and a leaner infant is possibly not getting enough breast milk. This feeding belief among mothers and families may contribute to a common feeding practice of early introduction of solids including ethnic foods. Latina mothers often introduce solid foods and cereal before the infant is four months old (Chaidez, Townsend, & Kaiser, 2011; Crocetti, 2004; Higgins, 2000; Kuo, Inkelas, Slusser, Maidenberg, & Halfon, 2010). Research by Kuo and associates (2010) revealed over 50% of Latina mothers introduced solids between four and six months of age, rates that were higher than black and white mothers.

The Latina mothers' perceived weight status of their infants appear to guide many of their daily feeding decisions. Researchers have found that these mothers often associate increased body weight with a sign of good health and therefore have difficulty recognizing obesity in their children (Higgins, 2000; Kaufman et al., 2009; Worobey & Lopez, 2005). Worobey and Lopez (2005) evaluated parents' beliefs of their children's weight and found that the Mexican mothers perceived their infants as their leanest and preferred the heavier infants more often than other ethnic groups. In others studies, mothers from different Latin countries showed a preference for a heavy infant. For these mothers a "chubby" infant is a happy and healthy baby, and thus fosters an increased maternal sense of identity and efficacy (Davis, Whaley, & Goran, 2011; Higgins, 2000; Kaufman & Karpati, 2007).

Infant Factors. Both the infant's temperament and dietary intake are factors appearing to contribute to maternal feedings practices and the infant's weight gain. Behavioral characteristics of infants are readily apparent soon after birth. Temperament is defined as the infant's behavioral style and occurs in relation to the environment and caregiving (McGrath, Records, & Rice, 2008). A mother's perception of her infants' temperament shapes the quality of the infant and mother interaction, which in turn further influences the development of infant temperament characteristics (Mäntymaa, Puura, Luoma, Salmelin, & Tamminen, 2006). Studies have revealed that infants who have a "difficult" temperament, characterized by excessive fussing and crying (Slining, Adair, Goldman, Borja, & Bentley, 2009), are more likely to show increased weight gain and body size in infancy (Carey, 1985; Darlington, 2006; Niegel, Ystrom, & Vollrath, 2007; Slining et al., 2009). These findings suggested that a fussy infant temperament might lead mothers to use feeding as a soothing technique (Carey, 1985; Darlington, 2006). Several studies have found that mothers use infant fussing or crying to gauge when their infant is hungry or when to begin complementary feeding, particularly solid foods (Baughcum et al., 2001; Heinig, 2005; Hodges, Hughes, Hopkinson, & Fisher, 2008). A study by Wasser and colleagues (Wasser et al., 2011) found that mothers who perceived their infants to be "fussy" were twice as likely to feed them solid foods before six months of age. Among Latina mothers, infant crying is commonly identified as an indicator of hunger or lack of satiety (Gross et al., 2010; Worobey, Islas Lopez, & Hoffman, 2008), and often a reason to supplement breastfeeding with formula feeding (Higgins, 2000; Kaufman et al., 2009) or solid foods (Gomel & Zamora, 2007; Higgins, 2000). A recent study of predictors of infant feeding frequency by Mexican immigrant mothers

found that the number of crying episodes was the only predictive factor of infant feeding (Gomel & Zamora, 2007; Worobey et al., 2008).

Dietary intake differs significantly in overweight versus normal weight Hispanic infants. In a comparison study of Mexican American infants and toddlers, Reifsnider and colleagues (2008) found significant differences in the dietary intake of overweight infants. The overweight group had significantly higher daily intakes of rice and sugar-sweetened beverages and shorter duration of breastfeeding compared to a group of normal growing infants. Hispanic infants receiving CBFF or formula feeding exclusively tend to have higher than recommended caloric intakes. Higgins (2000) conducted a qualitative study of Puerto Rican families and found that infant feedings far exceeded the nutritional requirements and often doubled the amount of formula recommended by the American Academy of Pediatrics (AAP). Beginning at two months of age, these mothers often fed their babies additional milk with added sugar and baby food in the bottles. Results from the National Health and Nutrition Examination Surveys (NHANES) 1999-2006 data, found that in contrast to CBFF and formula feeding, infants exclusively breastfed for four months showed a decreased risk for overweight and obesity between two and six years of age (Holmes, Auinger, & Howard, 2011).

Food Factors. Nutritional resources including food quality and quantity vary greatly among children from low-income households and may determine feeding behaviors among some ethnic and racial groups. A recent study of low-income toddlers showed that African American young children and mothers have increased access to ‘energy-dense’ foods compared to ‘nutrient-dense’ foods (Weatherspoon, Venkatesh, Horodyski, Stommed, & Brophy-Herb, 2013).

Increased access to foods high in calories may predispose low-income infants and children to rapid weight gain. In general, except for African American girls, obesity in children typically declines as income and parental education increase (Kumanyika & Grier, 2006). But annual income alone is not a specific enough measure of variability in economic resources in children from low-income homes. Measures of household food insecurity provide a specific indication of food deprivation that might influence diet quality and thus obesity in children (Whitaker & Orzol, 2006). However, the relationship between food insecurity and childhood obesity is unclear (Kaiser et al., 2002; Whitaker & Orzol, 2006). A large study of preschool children from different ethnic and racial groups found no association between childhood obesity and food insecurity (Whitaker & Orzol, 2006). In contrast, low-socioeconomic status and participation in federal food-assistance programs have been linked to increased obesity risk in young children (Gibbs & Forste, 2013; Rose, Bodor, & Chilton, 2006). This link may be explained by the increased formula feeding rates often displayed by mothers participating in the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) (Rose et al., 2006; Tenfelde, Finnegan, & Hill, 2011).

Additional research was needed to further describe important factors that contribute to an increase risk in obesity among low-income infants and children especially from minority groups like Latinos. Although evidence has demonstrated that rapid weight gain in infants is directly related to energy consumption (Ong et al., 2006), infants depend solely on their mothers or caregivers to meet their feeding needs and thus mothers play an important role in shaping eating habits and behaviors of infants (Anzman et al., 2010). A better understanding of factors

influencing Latina mothers feeding decisions and practices is of most importance to develop targeted interventions needed to promote and prevent health disparities like obesity. The primary aims of this study were to: (a) describe important maternal factors, infant factors, and food factors contributing to the feeding practices among Latina mothers, (b) examined associations between these factors and maternal feeding practices, and (c) determine predictive factors associated with maternal feeding practices. The secondary aims of the study were to: (a) examine associations between maternal factors, infant factors, food factors, and maternal feeding practices with infant weight gain, and (b) determine predictive factors associated with infant weight gain.

Methods

Study Design and Participants

The study was a descriptive correlational cross-sectional design with a convenience sample of low-income immigrant Latina mothers and their infants, aged 4-12 months, receiving assistance through WIC. Recruitment took place at the Child Development Resources (CDR) center and WIC offices in a group of southeastern cities. Mothers were eligible to participate if they met the following criteria: (a) Immigrant Latina mothers from Central, South America, or the Caribbean; (b) Ages 18 years of age or older with one infant aged anywhere from 4 to 12 months at time of enrollment; and (c) Low-income mother-infant dyads as defined as infant receiving food assistance through WIC. Mothers were excluded from the study if their infants had a history of chronic illness, prematurity or low-birth weight, any other factor that could

impact a child's growth as determined by parent or caseworker report, or they were the product of multiple births.

Procedure

Nurses and caseworkers at the CDR and WIC offices identified potential participants who met the study criteria. The staff at both agencies briefly introduced the study to potential participants, and asked permission to refer interested individuals to the investigator. If the investigator was not present at the time of subject recruitment, interested individuals were asked to provide their name and telephone number if they wished to be contacted by the investigator. One of the investigators, a native Spanish speaker, then contacted potential participants. Spanish flyers describing the study, eligibility requirements, and contact information for the study were available for participants. The informed consent was available in Spanish. The Spanish-speaking investigator provided an overview of the study, answered any questions and obtained signed consent forms from participants. The internal review boards of both the Virginia Commonwealth University and the Virginia Department of Health approved the study.

Data were obtained during one visit with the family. A Spanish-speaking investigator administered the surveys and guided the participants through the options. Each study visit took approximately 90 minutes to complete. Most study visits took place at the participants' homes and a few were conducted at some of the WIC offices. Participants who completed the study received a \$20.00 gift card for their time and effort. The following measures were obtained:

Measures

Maternal Factors

Demographics. Maternal sociodemographic information collected included: age, educational level, marital status, income, employment status, number of children and number of people living at home.

Perceived weight status of infant. The Baby Rating Scale (BRS) was used to assess the mother's perceived and desired weight status of the infant. The BRS consists of a line drawing continuum of nine babies who differ in size from leanest to heaviest. The mothers were asked to mark: (a) where they perceive their infant to be on the BRS (perceived weight), and (b) where they would like their infant to be on the BRS (desired weight). Response options are nine babies ranging from 1 (*leanest*) to 9 (*heaviest*), with higher scores indicating a heavier baby. The mean score was used in the analysis. The scale has shown good reliability and validity in a number of studies comparing the responses of individuals to assess ideal and acceptable body sizes of infants, children, and adults (Rand, Resnick, & Seidman, 1997; Rand & Wright, 2000).

Acculturation. A subscale from the Latina Mothers Child Feeding Practices Questionnaire (LMCFPQ) (Lindsay et al., 2011) was used to measure level of maternal acculturation. The subscale, '*about your culture*,' consists of seven items and measures language preference and proficiency (Marin, Sabogal, Marin, Otero-Sabogal, & Perez-Stable, 1987). Response options range from 1 to 5. Total scores can range from 7 to 35, with lower scores indicating low acculturation level and preference for the Spanish language. A mean score of acculturation is calculated. The internal consistency (α) of the '*about your culture*' subscale in this study was .88.

Feeding beliefs. The Infant Feeding Styles Questionnaire (IFSQ) was used to measure maternal beliefs and approaches to controlling her infant's feeding behaviors (Horodynski, et al., 2011). The instrument consists of two subscales: maternal feeding beliefs and maternal feeding behaviors. The maternal feeding behaviors subscale will be described under the maternal feeding practices outcome measures. The feeding beliefs subscale consists of 22 items and measures maternal beliefs about infant feeding. Response options are scored as: 1-*disagree*, 2-*slightly disagree*, 3-*neutral*, 4-*slightly agree*, and 5-*agree*. Several items are reversed scored. Total scores can range from 22 to 110, with lower scores indicating healthier feeding beliefs. A mean score for the subscale is calculated. The internal consistency (α) of the IFSQ (maternal feeding beliefs subscale) in this study was .83.

Knowledge and Self-efficacy. The Maternal Knowledge and Self-efficacy Scale (MKSES) scales consists of 11 basic knowledge items related to healthy infant-feeding practices, and seven self-efficacy items related to maternal confidence in her role as it relates to infant-feeding (Horodynski, et al., 2011). Maternal knowledge was measured using the MKSES knowledge subscale; response options are: 'Yes', 'No' or 'Don't know'. Total scores range from 11 to 22, with lower scores (*Yes*- 1 point and *No*- 2 points, exception #6 item needs to be reversed score), indicating greater knowledge. A mean maternal knowledge score was calculated in the analysis. Maternal self-efficacy was measured using the MKSES self-efficacy subscale; response options are scored as: 1-*very sure*, 2-*sure*, 3-*neutral*, 4-*unsure*, and 5-*very unsure*. Total scores can range from 7 to 35, with lower scores indicating higher self-efficacy. A mean score of maternal self-

efficacy is calculated. In this study, the internal consistency (α) of the MKSES was .47 (maternal knowledge subscale), and .52 (self-efficacy subscale).

Infant Factors

Temperament. The Pictorial Assessment of Temperament (PAT) was used to measure infant's temperament. The PAT is a 10-illustrated vignettes tool that requires the mother to select how she would categorize her infant's reaction to everyday situations as represented by drawings (Clarke-Stewart, Fitzpatrick, Allhusen, & Goldberg, 2000). The response options are: Baby X (*easy child*) = 1, Baby Y (*average or slow-to-warm-up child*) = 2, and Baby Z (*difficult child*) = 3. A mean score is calculated of infant difficultness (Clarke-Stewart et al., 2000). Total scores can range from 10 to 30, with the higher score meaning more difficult temperament. The PAT has been shown to have convergent validity with more widely utilized temperament questionnaires and has been validated with at-risk infants (Worobey et al., 2008). For the purpose of this study, the investigator, a native Spanish-speaker, translated the PAT into Spanish. An independent consultant back translated the tool into English. The internal consistency (α) of the PAT in this study was .65.

Dietary intake. Each infant's dietary intake was measured by a 24-hour diet recall. Each mother was asked to remember and report all the foods and beverages consumed by the infant in the previous day. The 24-hour diet recall is appropriate for this population because it does not require literacy and allows clarification of portion sizes, composition of foods like soups, and how much was consumed (Reifsnider, Keller, & Gallagher, 2006). The food intake for 24 hours was analyzed for nutrient content using the Food Processor III (ESHA Research, Salem OR), a

computer based software application composed of 50,000+ food items.

Food Factors

Food availability and insecurity. A subscale from the Latina Mothers Child Feeding Practices Questionnaire (LMCFPQ) (Lindsay et al., 2011) was used to measure level of food insecurity. The LMCFPQ subscale, '*making ends meet*,' measured food availability and insecurity in the home. The subscale consists of six items. The response options are grouped into two-stage approach, either as *agree* or *disagree*. Once participants select a response, they are guided to the next level (*slightly agree/disagree* or *strongly agree/disagree*). Items responses are scored as: 1- *slightly agree*, 2- *highly agree*, 3- *slightly disagree*, 4- *highly disagree*, 5- *don't know*, and 6- *refuses to answer*. Total scores can range from 6 to 24, with lower scores indicating a higher level of food insecurity in the home. A mean score of food insecurity is calculated. The internal consistency (α) of the '*making ends meet*' subscale in this study was .62.

Outcome Measures

Maternal Feeding Practices

The Infant Feeding Scale (IFS) was used to measure maternal feeding practices relating to types and frequency of foods fed to the infant, as well as the feeding environment. The scale is an adaptation of the Harvard Food Frequency Scale for children (Suitor & Gardner, 1992). The IFS consists of two subscales: food frequency scale and feeding environment scale. The first subscale is a 27-item food frequency scale. It identifies foods and beverages consumed by the infant including number of times offered daily, total food and liquid consumed in a 24-hour

period, and frequency of foods eaten during a week (Horodynski, et al., 2011). The food frequency subscale response options range from: 1- *rarely/never*, 2- *1-3 times per week* to 3- *4 or more times per week*. Feeding frequencies of food groups and beverages by age are presented in the analysis.

The second subscale of the IFS consists of questions related to the feeding environment at home. An 11-item subscale includes questions such as: (a) where the infant ate, (b) what the infant was doing during meal times, (c) whether the television was on, (d) if the mother sat with the infant, (e) what, if any, of the same foods did the mother eat, (f) how frequently the infant was fed, (g) when the infant was fed, and h) who fed the infant (Horodynski, et al., 2011). The response options are in a Likert scale ranging from: 1- *hardly ever*, 2- *some of the time*, 3- *most of the time*, to 4- *almost all the time*. Feeding environment differences by age are presented in the analysis. The IFS validity and reliability is presently being determined in a large multi-state randomized longitudinal controlled trial that includes Latino infants.

The Infant Feeding Styles Questionnaire (IFSQ) (Horodynski, et al., 2011) second subscale was used to measure maternal feeding style behaviors. The feeding behaviors subscale includes 46 items with response options scored as: 1- *never*, 2- *seldom*, 3- *half of the time*, 4- *most of the time*, and 5- *always*. Total scores range from 46 to 230, with higher scores indicating healthier maternal feeding practices (some items are reversed scored). A mean score for the subscale is calculated. In this study, the internal consistency (α) of the IFSQ maternal feeding behaviors subscale was .94.

Infant Weight Gain

The infant's weight and length at birth and time of visit were obtained from CDR or WIC records. If recent weight and length measures were not available, the investigator obtained the infant's measurements during the visit. The infant's weight was measured to the nearest 0.1 kg using an electronic scale with the infant wearing only a dry diaper. The infant's length was measured with a length board to the nearest millimeter. The infant's weight-for-length at both points were converted to z scores to allow group comparison by gender and age in months. For the purpose of this study, healthy weight was considered as $\leq 85^{\text{th}}$ percentile weight-for-length, where as overweight and at risk for obesity was defined as $> 85^{\text{th}}$ percentile weight-for-length based on the 2006 WHO growth charts (CDC, 2010).

Data Analysis

Statistical analyses were performed using statistical software package (version 22.0, Chicago, IL). The primary aims of this study were to: (a) describe important maternal factors, infant factors, and food factors contributing to the feeding practices among Latina mothers, (b) examined associations between these factors and maternal feeding practices, (c) determine predictive factors associated with maternal feeding practices. The secondary aims of the study were to: (a) examine associations between maternal factors, infant factors, food factors, and maternal feeding practices with infant weight gain, (b) determine predictive factors associated with infant weight gain. We calculated both descriptive and inferential statistics to address primary aim (a) of the study. Descriptive statistics, including measures of central tendency and dispersion, were computed on all model variables. Infant weight-for-length values were

converted into weight-for-length z-scores. Infants were categorized by age in three groups (4-6, 7-9, and 10-12 months) based on developmental differences in feeding needs and behaviors among the groups. Both maternal feeding practices and infant weight gain were evaluated as continuous variables. Bivariate correlations were performed according to primary aim (b) and secondary aim (a), to examine the relationships between the factors, and to select the factors that should be included as covariates in the regression models. Factors that correlated with feeding practices and infant weight gain with p -values < 0.25 were retained and included in the regression models when controlling for confounders. To address the primary aim (c) and secondary aim (b), hierarchical multiple regressions were conducted to determine the relationships between predictive factors and feeding practices, and between predictive factors and infant weight gain. The β and SE, and levels of significance were reported. A two-sided significance level of 0.05 indicated statistical significance.

Results

Primary Aims

The first primary aim was to describe maternal factors, infant factors, and food factors that contribute to feeding practices among Latina mothers. Characteristics of the study participants are displayed in Table 1. Sixty-two Latina mothers participated in the study. Eighty-six mothers were invited to participate, 18 declined, and six mothers were disqualified from participating because their infants did not meet inclusion criteria for age. All mothers were low-income immigrants from Central America. The majority were in their late 20s (mean age 28.6 years, $SD = 5.2$), and most were married or living with a partner (85.5%). Nearly one half of the mothers

reported completing only elementary to middle school education (45.2%), and the majority were unemployed (72.6%). Three-quarters of the participants were not currently breastfeeding their infants (74.2%). Infants ranged in age from 4 to 12 months (mean age 8.2 months, SD = 2.59). Fifty-five percent of infants were females. Over one-quarter of the infants (25.8%) were at >85th percentile weight for length and 21% were at \geq 98th percentile.

Table 2 describes maternal, infant and food factors in the study population. Overall, acculturation level was very low among the mothers (mean = 10.68, SD = 4.69). Maternal perceptions of their infants' weight scores were on the average (mean = 4.45, SD = 1.31). Similarly, maternal desired infants' weight scores were also on the average (mean = 4.69, SD = 1.49). However, among infants at the >85th percentile for weight-for-length, 27% of the mothers wished their infants were heavier. Maternal knowledge and self-efficacy scores were within the medium to low ranges (mean = 17.26, SD = 3.00, mean = 14.45, SD = 2.36 respectively), indicating these mothers have some knowledge gaps about healthy feeding practices but many felt comfortable in their roles as mothers as it relates to infant feeding. In general, the maternal feeding beliefs results indicate that mothers possessed healthy feeding beliefs that encourage more infant control over their feeding behaviors versus maternal control (mean = 47.55, SD = 14.73).

The infant's temperament measures showed that mothers did not perceived their infants as difficult (mean = 16.53, SD = 3.19). Results from the dietary intake analysis showed many of the infants were consuming higher rates of calories from fat and protein than the recommended dietary allowance (RDA) for age (mean = 237.78, SD = 87.67, mean = 16.92, SD = 9.31

respectively). Food availability or insecurity measures demonstrated a moderate level of food insecurity in the homes of these infants (mean = 13.50, SD = 3.63).

The second primary aim was to examine the relationships among maternal factors, infant factors, food factors and maternal feeding practices. The relationships between maternal, infant, and food factors and maternal feeding practices were examined using bivariate correlations. Maternal education ($p < .01$) and infant's age ($p < .01$) were significantly correlated with maternal feeding practices. There was a significant inverse correlation between maternal age ($p = .011$) and the number of people living at home ($p = .012$) with the feeding practices of mothers. Feeding practices were also significantly correlated to the infant's daily consumption of calories and protein ($p < .01$). All maternal, infant, and food factors that correlated with feeding practices with p -values ≤ 0.25 were included in the regression model. See Table 3 for factors included in the model.

The third primary aim was to determine predictive factors associated with maternal feeding practices in Latina mothers. We examined the ability of maternal factors, infant factors, and food factors to predict maternal feeding practices using a hierarchical multiple regression, controlling for the influence of infant's age (see Table 4). Infant's age was entered in Model 1, and explained 45% of the variance in maternal feeding practices. After entry of retained maternal, infant, and food factors that correlated with maternal feeding practices ($p \leq .25$) in Model 2, the total variance explained by the model as a whole was 61%, $F(15, 45) = 4.71$, $p < .01$. The factors included in the model explained an additional 16% of the variance in maternal feeding practices after controlling for infant's age, $R^2 \text{ change} = .16$, $F \text{ change}(14, 45) = 1.30$, $p <$

.24. In the final model, only two factors were statistically significant: infant's age and maternal education, with the infant's age recording a higher beta value ($\beta = 0.64, p < .000$) than maternal education ($\beta = 0.30, p < .01$).

Secondary Aims

The first secondary aim was to evaluate the relationships between the maternal factors, infant factors, food factors, maternal feeding practices and infant weight gain. The relationships between the factors, maternal feeding practices and infant weight gain were examined using bivariate correlations. There was a significant inverse correlation between maternal age ($p = < .05$) and the number of people living at home ($p = < .05$) with infant weight gain. Maternal perception of infant weight was also significantly correlated with infant weight gain ($p = < .05$). All maternal, infant, and food factors that correlated with infant weight gain with p -values ≤ 0.25 were included in the regression model (see Table 3).

The last secondary aim was to determine predictive factors associated with infant weight gain. The researchers used a hierarchical multiple regression to examine the ability of maternal factors, infant factors, and food factors to predict infant weight gain, controlling for the influence of infant's age, gender, and birth weight-per-length z -score (see Table 5). Infant's age, gender, and birth weight-per-length z score were entered in Model 1, and explained 4.5% of the variance in infant weight gain. After entry of retained maternal, infant, and food factors that correlated with infant weight gain ($p \leq .25$) in Model 2, the total variance explained by the model as a whole was 21.5%, $F(12, 49) = 1.12, p < .37$. The factors included in the model explained an additional 17% of the variance in infant weight gain after controlling for infant's age, gender, and birth weight-

per-length z-score, R squared change = .17, F change (9, 49) = 1.19, $p < .33$. In the final model, none of the factors were statistically significant.

Discussion

The purpose of this study was to expand on existing knowledge and describe important maternal factors, infant factors, and food factors contributing to overfeeding practices in a sample of low-income immigrant Latina mothers. A secondary purpose was to determine whether there was an association between these factors with maternal feeding practices as well as infant weight gain. This study is unique because it is one of very few studies focused on describing multidimensional factors possibly contributing to the high prevalence of overweight and obesity seen in Latino infants as compared to the general population. Key findings from the present study demonstrated: a) Most mothers preferred feeding their infants either formula or a combination of breast milk and formula feeding; b) An early introduction of ethnic foods and other inappropriate foods was common; c) Nearly half (47%) of all recruited infants were overweight or obese; d) Some mothers showed difficulty recognizing that their infant was overweight and voiced preference for a heavier baby, e) Maternal education and infant's age were significant predictors of less controlling feeding practices, f) No significant predictors of infant weight gain were found. The following is a discussion of the findings summarized by study aims.

Primary Aims

Congruent with findings from a recent review (Cartagena et al., 2014), this group of low-income immigrant mothers were not inclined to breastfeed exclusively even for the first six

months. Almost 100% of the breastfeeding mothers were supplementing with formula feedings. For most mothers the preferred feeding method was formula over breast milk since 74% were exclusive formula feeders. Researches have found that Hispanic immigrant mothers are more likely than U. S. born mothers to initiate breastfeeding but they are less likely to breastfeed exclusively (Gibson-Davis & Brooks-Gunn, 2006; Harley, Stamm, & Eskenazi, 2007). The influence of acculturation, often measured as English language proficiency or years of U.S. residency, on breastfeeding practices of Latinas have been extensively studied (Anderson et al., 2004; de Bocanegra, 1998; Gibson, Diaz, Mainous, & Geesey, 2005; Gibson-Davis & Brooks-Gunn, 2006; Gorman et al., 2007; Harley et al., 2007; McKee, Zayas, & Jankowski, 2004; Vaaler, Stagg, Parks, Erickson, & Castrucci, 2010). Overall, these researchers showed that the longer immigrant Hispanic mothers live in the U.S., the greater the chances that these mothers will not breastfeed at all (Harley et al., 2007). Although this study did not measure years of maternal U.S. residency, most mothers showed a low acculturation level, as they were predominately Spanish-speakers. As shown in the literature, these mothers displayed high breastfeeding initiation rates (85.5%), but they favored feeding their infants either formula (74.2%) or a combination of breast milk and formula (24.2%).

One factor that contributes to nonexclusive breastfeeding practices in Latinas is the belief that feeding a combination of breast milk and formula is best for the infant (Bartick & Reyes, 2012; Bunik et al., 2006). This may explain why with the exception of one mother, all our mothers in the breastfeeding group were supplementing with formula. Studies on nonexclusive breastfeeding attitudes of Hispanic women show that these mothers often prefer “las dos cosas”

or breast and formula feeding, because they believe the combination provides the best nutrition for their infants. Many other factors may influence common nonexclusive breastfeeding rates among low-income Latinas. Rose et al., (2006), found a significant negative association of WIC's formula incentive with breastfeeding rates among WIC mothers. Empiric studies should further explore the links between formula incentives and breastfeeding practices of WIC participants. Future research should also focus on the development of culturally appropriate and meaningful interventions that address the need to educate these mothers and families on the benefits and value of breast milk as a complete source of nutrition for infants.

Among maternal sociodemographic factors, maternal education was significantly associated with healthier or less controlling feeding practices. This finding may explain why there was a significant inverse correlation between maternal age and healthier feeding practices. Mothers younger than 32 yrs of age were more likely to have completed high school (46%) compared to older mothers (23%). Interestingly, regardless of maternal age and education, the majority of mothers showed preference for Spanish language-use both at home and with friends (mean = 10.68, SD = 4.69). It is possible that younger and better-educated mothers are more apt to seek advice and follow recommendations from health care providers about adequate feeding practices despite language preference.

A significant infant factor associated with maternal feeding practices was infant's age. Maternal feeding practices and patterns vary depending on the infant's developmental stage, and may have contributed to less controlling maternal feeding practices, as infants in our study got older. Also as infants grew and developed, mothers may have felt more comfortable in their roles

and acquired feeding patterns that were more attuned to their infant's developmental needs. Evidence has shown that infants from minority, low socioeconomic families are more likely to be formula feeders and to experience unhealthier feeding practices like being pressured to finish milk contents from a bottle (Gibbs & Forste, 2013). These unhealthy feeding practices are linked to early childhood obesity (Gibbs & Forste, 2013). Various researchers have found that formula feeding as well as early introduction of solids may interfere with infant's satiety responsiveness (Brown & Lee, 2012; Li, Magadia, Fein, Grummer-Strawn, 2012). In contrast, breastfeeding have shown a protective effect against the risk of developing obesity in infancy and childhood because breastfeeding promotes infant self-regulation and decreases maternal control of the feeding (Gibbs & Forste, 2013). In the present study, the infant's age and maternal education were significant predictors of maternal feeding practices that allowed more infant control over the feeding experience.

Our study findings are congruent with findings from other studies on the dietary intake of Latino infants (Mennella, Ziegler, Briefel, & Novak, 2006; Reifsnider & Ritsema, 2008). Researchers of the Feeding Infants and Toddlers Study (FITS) concluded that Hispanic infants older than six months were more likely than non-Hispanic babies to be eating fresh fruits, fruit-flavored drinks, and other foods like soups, rice, and beans, foods that are common in Hispanic cultures (Mennella et al., 2006). As shown in Table 5, by age four to six months, 11% of infants were consuming grains like breads, rice and pasta, and other 23% were consuming potatoes, 33% fresh fruits, 11% meats, 12% beans, close to 6% eating cheese, eggs and snacks like crackers, chips or pretzels, and approximately 28% drinking 100% fruit juice on a daily basis. This

prevalence of being fed rice, potatoes, meats, beans, snacks, and juice, in addition to fruit-flavored drinks increased among infants age seven to nine months and 10 to 12 months old. The AAP recommends that infants be exclusively breastfed for the first six months of life. In addition, the AAP Committee on Nutrition supports introduction of appropriate complementary foods between age four and six months and continued breastfeeding for at least 12 months (AAP, 2006). Early introduction of high-calorie foods like snacks and fruit-flavored drinks prior to six months contribute to increased energy consumption and unhealthier eating habits that result in rapid weight gain in infancy.

Other findings from the 24-hour dietary recall point to some potential differences in the dietary intake of Latino infants that may explain their higher propensity toward being overweight. Because researchers were unable to reliably measure breastfeeding quantities, the calculated amount of total calories consumed was underestimated in breastfeeding infants. Overall, infants consumed more calories from fat and protein than the recommended dietary allowance for age (percent above recommended calories from fat, mean = 116.86, SD = 47.37, and percent above recommended protein, mean = 158.30, SD = 90.56). Higher protein intake in formula feeding as compared to the protein content in breast milk has been postulated to play a role in predisposing infants to an increased risk for obesity later in life (Koletzko et al., 2009). In a multicenter, randomized clinical trial conducted in five European countries, researchers investigated whether higher or lower protein intakes during the first year of life could influence weight gain up to two years of age as well as increase the obesity risk during school age (Koletzko et al., 2009). Grote and colleagues found that infants consuming formulas with higher

protein content had higher body weight at two years of age than those infants taking formulas with low protein content. The higher consumption of calories from fat and protein seen in the studied population could be explained by the increased number of infants being formula fed and the early introduction of foods high in protein like meats, eggs and beans. Future empiric studies should further determine the predictive influence of dietary intake like protein and other nutrients on the risk of obesity development in early childhood.

Healthy dietary intake and eating habits develop from healthy feeding environments and healthy mother-infant interactions (Weatherspoon et al., 2013). Our data shows that almost always the TV was turned on where the infant could see it while eating for approximately 39% of four to six month olds, 17 % of seven to nine month olds, and nearly 24% of 10 to 12 month olds. Plus, almost always 22% of four to six month olds either listened or looked at the TV while they were being fed (see Table 7). Allowing children to watch too much television may encourage unhealthy eating behaviors (Hertzler & Fray, 1999), and decrease the opportunity for critical mother-child interaction during mealtime. Parental interaction and engagement with children during mealtime is shown to facilitate better feeding behaviors (Weatherspoon et al., 2013). However, excessive maternal control over feeding behaviors and intake could hinder infant's ability for self-regulation (Golan & Bachner-Melham, 2011). Most infants by nine months of age have acquired the fine motor skills necessary to feed themselves and eat some table foods prepared for the rest of the family. Interestingly among our participants, 91% of seven to nine, and 76% of 10 to 12 month old infants, almost always were fed by their mothers. In accordance with this finding, Miller and Howard (2002) reported Puerto Rican mothers were

more likely to feed their infants on their laps and to spoon-feed them rather than encourage self-feeding at 12 months. In the present study, many of the older infants were fed primarily by their mothers and in front of the TV, conditions that promote unhealthy feeding behaviors and overfeeding.

The economic resources of the Hispanic families influence maternal feeding choices and behaviors. There was a moderate level of food insecurity among our group of mothers. Although there was not a significant association between food insecurity and feeding practices, there was a significant inverse correlation between mother's age and food insecurity. Older mothers were living in homes with higher economic needs and increased food insecurity. Our findings also showed a significant inverse correlation between the numbers of people living at home and maternal feeding practices. Low-income Hispanic families often live in crowded housing where relatives and friends share limited living space and finances. Grandparents and relatives are commonly involved in caring for young children at home (Kaufman & Karpati, 2007).

Overfeeding is likely to occur when many extended family members are involved in feeding the infant (Higgins, 2000; Kaufman & Karpati, 2007), and working mothers often have little control over the feeding practices of their infants' caregivers. Our data demonstrated that infants from crowded homes had less healthy feeding practices. This finding is contrary to a recent study conducted with Mexican American toddlers where overweight children were least likely to eat by themselves and lived in least crowded homes (Reifsnider & Ritsema, 2008). Authors postulated that overweight toddlers could have received more attention possibly through food.

Secondary Aims

In the present study, infant's weight gain was not significantly correlated with any of the measured variables. Although neither maternal perception of infant's weight nor her desired infant's weight predicted feeding practices or infant weight gain, approximately one third of mothers (27.5 %) of overweight infants failed to recognize their babies as overweight and expressed desire for a heavier baby. Similarly, among healthy weight infants, 27.3 % of mothers also expressed desire for a heavier baby. Our findings are congruent with findings of many other researchers that Hispanic mothers show preference for a heavy infant regardless of the infant's weight (Davis et al., 2011; Evans et al., 2009; Higgins, 2000; Kaufman & Karpati, 2007; Worobey & Lopez, 2005), because these mothers associate a "chubby baby with a healthy baby." This culturally based misconception of what constitutes healthy weight gain in infancy, may lead to overfeeding practices and thus contribute to the higher overweight and obesity rates seen among Latino infants. The overweight rate seen in the studied population was higher than the rate published in the literature and may have resulted from maternal feeding behaviors that promoted overfeeding. Immigrant Latina mothers may need increased awareness and understanding of the potential link between infant overweight and obesity with the risk of acquiring adverse health outcomes like diabetes and cardiovascular disease later in life. Further exploring this possible knowledge gap could have tremendous implications for the development of targeted prevention programs aimed at reducing health disparities among Latinos.

Cultural views of what constitutes healthy infant feeding behaviors and weight gain influence maternal feeding decisions and practices that could foster overfeeding. Recommending change in long-held cultural beliefs pose significant challenges to healthcare providers. Thus intervention

efforts could be more effectively guided toward educating Latina mothers about the unique benefits of breastfeeding for both mother and infant (AAP, 2012), plus proven increased infant self-regulation in feeding that may contribute to healthier childhood and healthier eating habits later in life. An emphasis on the benefits of breastfeeding in improving health outcomes must be clearly communicated, instead of focusing exclusively on rapid infant weight gain. These mothers associate infant weight gain with good health, and feeding with expressions of nurturing and good parenting (Kaufman & Karpati, 2007; Sussner et al., 2008). In addition, for low-income immigrant mothers, formula feeding represents an adequate and readily available source of nutrition from WIC. A study on the predictors of exclusive breastfeeding among WIC participants showed that women who received first-trimester prenatal care were more likely to breastfed exclusively than women who received prenatal care later in pregnancy (Tenfelde et al., 2011). Early prenatal bilingual breastfeeding classes and immediate postpartum education and support are essential to encourage and promote exclusive breastfeeding important to decrease the risk of obesity among Latino infants. Additional research is needed to further delineate maternal motivating factors necessary to bring about behavior changes in infant feeding and improve health outcomes in this ethnic group.

Limitations

There are several limitations in this study. The study population consisted of a convenience sample of eligible mothers and infants possibly resulting in selection bias. Nevertheless, the majority of mothers who were approached agreed to participate and they were enrolled consecutively. The study population consisted of immigrant low-income Latina mothers, and

may not be generalizable to other U.S. born Hispanics and with other socioeconomic status. Research should be conducted with other Hispanic subgroups, in other geographical locations, a larger sample size, and with more linguistically appropriate and reliable measures. For example, one major limitation was the lack of well-developed and reliable Spanish-language tools needed to measure many of the variables of interest. Two instruments in particular, the IFSQ and MKSES (both subscales), used a dialect that was often very difficult for our mothers to understand. This limitation may have obstructed some of the results because of mother's inability to fully understand the questions despite the investigator's attempts to clarify meaning of particular words or questions. Future research in this area should focus on the development and testing of well-operationalized and rigorously developed instruments much needed for the study of Hispanic families. The measurement of breastfeeding practices, an important factor in infant weight gain, in the current study was restricted because additional data on breastfeeding attitudes like reasons why mothers terminated breastfeeding was not obtained. Given that Latina mothers are more inclined to initiate breastfeeding, additional data on maternal attitudes especially related to early breastfeeding cessation could guide the development of future interventions aimed at improving the breastfeeding rates of this ethnic group. The cross-sectional design of the study was also a limitation and prohibits any inferences of causality. Lastly, the multiple regression models could explain only 61% (maternal feeding practices) and 21.5% (infant weight gain) of the variances respectively. This indicates that a wide range of maternal, infant and environmental factors were not measured in the study and may contribute to maternal feeding practices and infant weight gain in Latinos.

Conclusions

Obesity in infants and young children results from maternal feeding practices and home environments that foster unhealthy eating behaviors. In Latino infants, obesity is most likely attributed to maternal feeding practices that promote overfeeding. The overall purpose of this study was to expand on existing knowledge and describe important multidimensional factors contributing to overfeeding practices in a sample of low-income immigrant Latina mothers. Latina mothers are inclined to overfeeding tendencies because they favor formula or mixed breast milk and formula feedings over exclusive breastfeeding, practice early introduction of ethnic foods like beans, rice and soups, and show preference for heavier looking babies.

One of the goals of Healthy People 2020 is to increase exclusive breastfeeding rates to approximately 25% at six months. Latina mothers are far from reaching this goal (U.S. Department of Health and Human Services, 2010). Given the protective benefit of breastfeeding in reducing the risk of early childhood and adult obesity (Dewey, 2003; Owen et al., 2005), intervention efforts should focus primarily on the promotion of healthy feeding practices that encourage and support exclusive breastfeeding among this ethnic group. Future research should further explore the influence of socioeconomic factors such as formula incentives on breastfeeding practices of low-income immigrant mothers. Additional research is also needed for the development and testing of culturally sensitive instruments to evaluate maternal health beliefs related to infant feeding and guide targeted interventions that are meaningful and successful in bringing about behavior change among Latina mothers.

Table 1
Demographic Characteristics of Participants (N = 62)

Characteristic	n	%
Mothers		
Age in years, mean (SD)	28.63	5.20
Number of children		
One	14	22.2
More than one	48	76.2
Marital status		
Married or living with partner	53	85.5
Separated or divorced	3	4.8
Never Married	6	9.7
Education		
Elementary to middle school	28	45.2
Some high school	20	32.2
Completed high school	12	19.3
Some college or university	2	3.2
Employment		
Yes	17	27.4
No	45	72.6
Infants		
Sex		
Female	34	54.8
Male	28	45.2
Age in months, mean (SD)	8.21	2.59
4-6	18	29.0
7-9	23	37.1
10-12	21	33.9
Weight status		
Overweight (> 85%)	29	46.8
Normal (\leq 85%)	33	53.2
Breastfeeding		
Initiation rate	53	85.5
Exclusive	1	1.6
Non-exclusive	15	24.2
Formula feeding	46	74.2

Table 2
Description of Maternal Factors, Infant Factors, and Food Factors

Variables	Potential Range	Observed Range	M	SD
Maternal factors				
Infant perceived weight	1 - 9	1 - 9	4.45	0.31
Infant desired weight	1 - 9	1 - 9	4.69	1.49
Acculturation	7 - 35	7 - 26	10.68	4.69
Feeding beliefs	22 - 110	26 - 96	47.55	14.73
Knowledge	11 - 22	12 - 24	17.26	3.00
Self-efficacy	7 - 35	10 - 21	14.45	2.36
Infant factors				
Birth weight- z score	—	-4.30 - 3.10	-0.04	1.33
Temperament	10 - 30	10 - 23	16.53	3.19
Dietary intake				
Total Calories	—	188.30 -	634.30	199.66
Calories from fat	—	1088.14	237.78	87.67
Protein	—	45.67 - 457.29 3.43 - 50.08	16.92	9.31
Food Factors				
Food insecurity	6 - 24		13.50	3.63
Number of people living at home	—	8 - 23 2 - 9	5.15	1.44
Outcome variables				
Feeding practices	46 - 230	79 - 218	159.84	42.28
Current weight - z score	—	-1.20 - 4.40	1.04	1.25

Table 3

Correlations between Maternal Factors, Infant Factors, Food Factors and Maternal Feeding Practices and Infant Weight

Factors	Feeding Practices	Infant Weight Gain
Maternal		
Age	-.322 **	-.224 *
Number of children	-.207 †	.044
Education	.367 **	.007
Employment	-.015	-.094 †
Infant perceived weight	.124 †	.211 *
Infant desired weight	.146 †	-.009
Knowledge	.012	.190 †
Self-efficacy	.027	.032
Acculturation	.138 †	-.044
Feeding beliefs	-.004	-.093 †
Feeding practices		.110 †
Infant		
Age	.673 **	.112 †
Sex	.084	-.114 †
Birth z score	-.231 *	.142 †
Calories	.330 **	.012
Calories from fat	.087 †	-.019
Protein	.435 **	.003
BF days	.092 †	.031
Temperament	.112 †	.169 †
Food		
Food insecurity	.147 †	.155 †
Number of people living at home	-.318 **	-.242 *

Note. BF = breastfeeding; † $p \leq .25$; * $p < .05$; ** $p < .01$.

Table 4
Predictive Factors of Maternal Feeding Practices, Controlling for Age of Infant

Predictor	β	SE	<i>p</i>
Model 1			
Age of child	.67	1.57	.00**
Model 2			
Maternal factors			
Age	-.09	1.01	.48
Education	.30	4.56	.01*
BRS (perceived)	-.10	5.17	.56
BRS (desired)	.04	4.52	.81
Acculturation	.01	1.00	.96
No. children	-.05	11.64	.68
Infant factors			
Age	.64	2.38	.00**
Birth weight- z score	-.04	3.44	.71
Temperament	.01	1.50	.94
Dietary intake			
Total Calories	.19	.05	.43
Calories from fat	.10	.10	.62
Protein	-.23	.82	.22
BF days	.12	.05	.31
Food Factors			
Food insecurity	-.07	1.31	.57
No. people living at home	-.17	3.21	.13

Table 5

Predictive Factors of Infant Weight, Controlling for Age of Infant, Sex, and Birth Weight

Predictor	β	SE	p
Model 1			
Age of child	.14	.06	.30
Sex	-.07	.33	.62
Birth z score	.15	.13	.27
Model 2			
Maternal Factors			
Age	-.18	.04	.27
Employment	-.08	.45	.64
Infant perceived weight	.20	.13	.15
Knowledge	.17	.06	.23
Feeding beliefs	-.08	.01	.58
Feeding practices	-.04	.01	.83
Infant Factors			
Age	.06	.09	.77
Sex	-.13	.35	.37
Birth z score	.10	.14	.52
Temperament	.12	.06	.47
Food Factors			
Food Insecurity	.60	.05	.68
No. people living at home	-.13	.13	.41

Note. R^2 changed from .045 to .215. Whole model explains 22% of variance after adjusting for age of child, sex, and birth z score ($p < .37$).

Table 6
Foods and Beverages Consumed by Age Groups per Week (1-3 times or 4 or more times)

Foods and Beverages	Age in months					
	4-6 (n = 18)		7-9 (n = 23)		10-12 (n = 21)	
	%		%		%	
	1-3	4 or >	1-3	4 or >	1-3	4 or >
Grain products						
Baby cereal	22	22	30	39	33	24
Cereal w/o sugar	—	—	26	17	43	29
Cereal w/ sugar	—	—	4	—	10	—
Breads, rice, pasta, cereal bars	11	—	61	22	52	29
Vegetables						
Vegetable baby foods	22	28	22	52	14	33
Potatoes	17	6	52	26	38	29
Fried potatoes (NOT fast food)	—	—	9	—	33	5
Yellow vegetables	28	6	65	17	43	29
Green vegetables	22	—	35	9	52	24
Other vegetables	—	—	—	—	—	—
Milk products						
Cheese	6	—	13	9	38	14
Yogurt	17	—	35	39	24	57
Cow's milk	—	—	—	—	48	—
Fruits						
Fruit baby food	22	44	26	65	14	67
Canned/fresh fruits	22	11	39	48	19	71
Meats & protein						
Meat baby food	—	—	9	13	—	—
Meats	11	—	35	22	48	33
Processed meats	—	—	9	—	19	—
Fish	—	—	13	—	33	—
Eggs	6	—	26	9	62	10
Beans	6	6	48	13	29	62
Snacks & fast food						
Donuts, biscuits, muffins, cakes, pies, cookies, brownies	—	—	9	4	29	—
Milk desserts	—	—	22	—	52	5
Candy	—	—	—	—	10	—
Chips, crackers, popcorn, pretzels	6	—	22	—	43	5
Nuts	—	—	—	—	19	—
Fast food	—	—	13	—	10	—
Beverages						
100% Fruit Juice	17	28	17	61	14	76
Fruit drink, Kool-aid, Hi-C	—	—	4	4	24	24
Regular Soda	—	—	—	—	19	—
Water	17	44	4	91	—	95

Table 7
Feeding Environment Patterns and Infant Behavior Differences by Age (%)

Feeding Environment	Age in months								
	4-6			7-9			10-12		
	Almost never	Usually	Always	Almost never	Usually	Always	Almost never	Usually	Always
TV is on where baby can see it while feeding	39	—	39	57	—	17	38	10	24
Baby listens or looks at TV while eating/feeding	56	—	22	52	9	9	33	10	5
Baby is w/ family while family is eating	17	11	61	—	13	74	—	5	86
Mother feeds baby herself	—	—	100	—	9	91	5	5	76
Baby eats with his/her fingers	89	—	—	39	—	13	10	24	33
Baby uses a spoon or fork	94	—	6	78	4	9	62	14	10
Baby drinks from a sippy cup	94	6	—	39	13	4	19	14	29
Baby drinks from a regular cup	100	—	—	87	—	—	57	5	—
Baby drinks from a bottle	6	—	94	—	22	78	14	29	43
Mother sits w/ baby while she/he eats	—	—	100	—	—	100	5	—	91
Baby plays w/ toys while eating	94	—	6	83	—	—	76	5	—

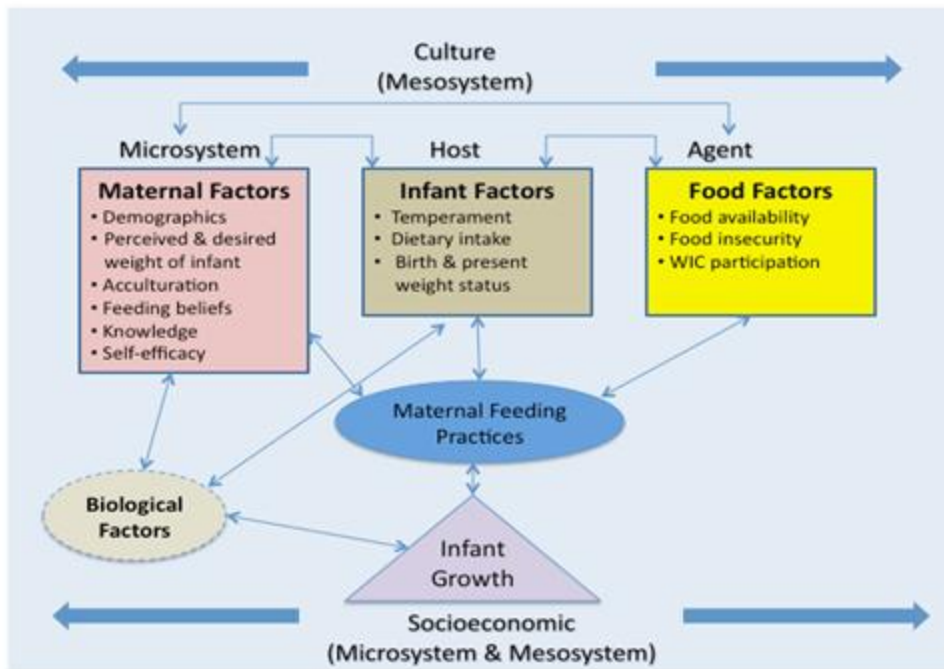


Figure
Ecological Model of Growth

Chapter 5 – Summary

Obesity in infants and children has reached epidemic proportions and Latino infants persistently show higher rates compared to white or black infants. Empiric evidence is lacking to fully explain the reasons behind this serious health disparity. In Latino infants, obesity is most likely attributed to maternal feeding practices that promote overfeeding. The overall purpose of this study was to expand on existing knowledge and describe important multidimensional factors contributing to overfeeding practices in a sample of low-income immigrant Latina mothers. A planned research trajectory focusing on obesity among Latino infants would contribute to nursing science in this important area of research.

Obesity prevention and intervention efforts must begin early in life and be targeted to high-risk groups like Latinos. Latina mothers need increased understanding about the unique benefits of breastfeeding for both mother and infant. An emphasis on the benefits of breastfeeding in promoting healthier eating habits and improving health outcomes must be clearly communicated and reinforced in targeted prevention programs. Future intervention studies aiming at increasing exclusive breastfeeding as well as sustained breastfeeding rates are needed. Increasing early prenatal bilingual breastfeeding classes and providing immediate but prolonged postpartum education and support are potential intervention measures that may promote exclusive breastfeeding important to decrease the risk of obesity among Latino infants.

Future empirical studies should contribute to the development and testing of well-operationalized and rigorously developed instruments much needed for the study of Hispanic

families. Reliable and culturally sensitive instruments may result in better understanding and new knowledge about the influencing forces behind immigrant Latina mother's feeding decisions and practices. Improved Spanish-language instruments would facilitate evaluation of maternal health beliefs related to infant feeding and guide targeted interventions that are meaningful and successful in bringing about behavior change among Latina mothers.

In the study of infant and childhood obesity, there is a need for cost-effective and innovative interventions aimed at preventing rapid weight gain and its serious health consequences. Findings from the present study showed Latina mothers are inclined to overfeeding tendencies and are unlikely to practice exclusive breastfeeding. Improving breastfeeding rates with culturally appropriate interventions may prove to be a cost-effective and beneficial intervention aimed at decreasing health disparities and improving life long health outcomes for Hispanic infants and future generations.

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Appendix 1

Demographic Data

LMCFQ- About You and Your Child

Let's start! First, I am going to ask you some general questions about your child, you and your background.

1. How many children do you have?

☐ One₁

☐ More than one₂

1a. How old are they?

_____ years old

_____ years old

_____ years old

INTERVIEWER: I would like you to think about your child BETWEEN THE AGES 4-12 months when answering the questions in this interview. Let's start!

2. What is your child's date of birth?

_____/_____/_____
(Month) (Day) (Year)

3. What is your child's sex?

☐ Female₁

☐ Male₂

4. How many brothers and sisters does your child have? Please include step-brothers and step-sisters.

☐ 0₀

☐ 1₁

☐ 2₂

☐ 3₃

☐ 4₄

☐ 5₅

☐ 6₆

☐ Over 6₇

☐ Don't know

☐ Refused

INTERVIEWER: The next questions are about you.

5. How old are you?

_____ (years)

☐ Don't know

☐ Refused

6. What is your height?

_____ feet _____ inches

☐ Don't know

☐ Refused

7. What is your weight?

_____ pounds

☐ Don't know

☐ Refused

8. How do you describe your weight? Would you say you are very underweight, slightly underweight, about the right weight, slightly overweight, or very overweight?

☐ Very underweight₁

☐ Slightly underweight₂

☐ About the right weight₃

☐ Slightly overweight₄

☐ Very overweight₅

☐ Don't know

☐ Refused

9. Are you pregnant now?

☐ Yes → During your current pregnancy, have you:

☐ Gained weight₁

10a1. About how much? _____ pounds

☐ Lost weight₂

10a2. About how much? _____ pounds

☐ Remained the same weight₃

☐ No₂

☐ Don't know₃

☐ Refused₄

10. What is the highest level of school you have finished?

☐ Elementary school, 8th grade or less₁

☐ Some high school, 9th through 12th grade₂

☐ Completed high school, 12th grade or GED₃

☐ Vocational or trade school after high school₄

☐ Some college or university₅

☐ Associate degree from college or university₆

☐ Bachelor degree from college or university₇

☐ Post graduate degree from college or university (for example, a master's degree or doctorate)

8

☐ Other₉

11a. (please describe) _____

☐ Don't know₁₀

☐ Refused₁₁

11. Are you....

☐ Married or living with partner₁

☐ Separated₂

☐ Divorced₃

☐ Never married₄

☐ Widowed₅

☐ Don't know₆

☐ Refused₇

12. Are you now working at a paying job?

☐ Yes₁ → How many total hours did you work in the past seven days?

_____ hours

☐ Don't know

☐ Refused

☐ No₂

☐ Don't know₃

☐ Refused₄

13. How many people usually live in your home? Count yourself and everyone else who usually lives in your home, even if they are not related to you. Count children and adults.

_____ (number of people)

☐ Don't know

☐ Refused

14. What is your total yearly household pre-tax income from all sources?

☐ Under \$10,000₁

☐ Under \$20,000₂

☐ Under \$30,000₃

☐ Under \$40,000₄

☐ Under \$50,000₅

☐ Under \$60,000₆

☐ \$60,000 or more₇

☐ Do not know₈

☐ Refuse to answer₉

15. Do you participate in any of the following programs?

15a. Food Stamps

☐ Yes₁

☐ No₂

☐ Don't know₃

☐ Refused₄

15b. Head Start

☐ Yes₁

☐ No₂

☐ Don't know₃

☐ Refused₄

15c. Medicaid

☐ Yes₁

☐ No₂

☐ Don't know₃

☐ Refused₄

16. Were you on WIC when you were pregnant with your child (son/daughter)? **(Remember, we are talking about your child aged 4 – 12 months old...)**

☐ Yes₁

- ☐ No₂
- ☐ Don't know₃
- ☐ Refused₄

17. Did you participate in the WIC program after your son/daughter was born?

- ☐ Yes₁
- ☐ No₂
- ☐ Don't know₃
- ☐ Refused₄

18. In the past six months, did you yourself receive services from the WIC program?

- ☐ Yes₁
- ☐ No₂
- ☐ Don't know₃
- ☐ Refused₄

19. In the past six months, not counting yourself, has another member of the family participated in WIC

- ☐ Yes₁
- ☐ No₂
- ☐ Don't know₃
- ☐ Refused₄

Appendix 2

LMCFQ- About Your Culture

Now I will ask you some questions about your cultural background.

1. In general, what language(s) do you read and speak?

- ☐ Only Spanish₁
- ☐ More Spanish than English₂
- ☐ Both equally₃
- ☐ More English than Spanish₄
- ☐ Only English₅

2. What was the language(s) you used as a child?

- ☐ Only Spanish₁
- ☐ More Spanish than English₂
- ☐ Both equally₃
- ☐ More English than Spanish₄
- ☐ Only English₅

3. What language(s) do you usually speak at home?

- ☐ Only Spanish₁
- ☐ More Spanish than English₂
- ☐ Both equally₃
- ☐ More English than Spanish₄
- ☐ Only English₅

4. In which language(s) do you usually think?

- ☐ Only Spanish₁
- ☐ More Spanish than English₂
- ☐ Both equally₃
- ☐ More English than Spanish₄
- ☐ Only English₅

5. What language(s) do you usually speak with your friends?

- ☐ Only Spanish₁
- ☐ More Spanish than English₂
- ☐ Both equally₃
- ☐ More English than Spanish₄

☐ Only English₅

6. In what language(s) are the T.V. programs you usually watch?

☐ Only Spanish₁

☐ More Spanish than English₂

☐ Both equally₃

☐ More English than Spanish₄

☐ Only English₅

7. Your close friends are:

☐ Only Latinas/ Hispanics₁

☐ More Latinas/Hispanics than Americans₂

☐ As many Latinas/Hispanics as Americans₃

☐ More Americans than Latinas/Hispanics₄

☐ Only Americans₅

Appendix 3

LMCFQ- Making Ends Meet

In the next questions, I will ask you how you make ends meet. Please tell me whether you agree with each statement I read. I will then ask you another question to better understand your level of agreement.

INTERVIEWER INSTRUCTIONS: *Please check **ONLY one response option!** If respondent answers “Yes” to a statement, proceed to the next level and ask the extent to which she agrees with the statement and mark accordingly. If respondent answers “No” to a statement, proceed to the next level and ask the extent to which she disagrees with the statement and mark accordingly. DO NOT read “Don’t Know” or “Refused” as response options and only mark the option if the respondent provides one of these answer on her own accord. If the respondent answers “Don’t Know” or refuses to answer, proceed to the next statement.*

1. I limit the types of food I buy because of our tight budget. (Do you agree with this statement?)

- Yes → ASK: Would you say that you slightly agree or strongly agree?
☐ Slightly agree
☐ Strongly agree
- No → ASK: Would you say that you slightly disagree or strongly disagree?
☐ Slightly disagree
☐ Strongly disagree
- Don't know → ☐
- Refused → ☐

2. I often have to try different ways to save money on food. (Do you agree with this statement?)

- Yes → ASK: Would you say that you slightly agree or strongly agree?
☐ Slightly agree
☐ Strongly agree
- No → ASK: Would you say that you slightly disagree or strongly disagree?
☐ Slightly disagree
☐ Strongly disagree
- Don't know → ☐

- Refused → ☐

3. Fresh fruits and vegetables cost too much. (Do you agree with this statement?)

- Yes → ASK: Would you say that you slightly agree or strongly agree?
☐ Slightly agree
☐ Strongly agree
- No → ASK: Would you say that you slightly disagree or strongly disagree?
☐ Slightly disagree
☐ Strongly disagree
- Don't know → ☐
- Refused → ☐

4. It does not cost a lot for my family to eat at fast food restaurants. (Do you agree with this statement?)

- Yes → ASK: Would you say that you slightly agree or strongly agree?
☐ Slightly agree
☐ Strongly agree
- No → ASK: Would you say that you slightly disagree or strongly disagree?
☐ Slightly disagree
☐ Strongly disagree
- Don't know → ☐
- Refused → ☐

5. In the past six months, the food that (I/we) bought just didn't last, and (I/we) didn't have any money to get more. (Do you agree with this statement?)

- Yes → ASK: Would you say that you slightly agree or strongly agree?
☐ Slightly agree
☐ Strongly agree
- No → ASK: Would you say that you slightly disagree or strongly disagree?
☐ Slightly disagree
☐ Strongly disagree
- Don't know → ☐
- Refused → ☐

6. In the past six months, I/we couldn't afford to eat balanced meals. (Do you agree with this statement?)

- Yes → ASK: Would you say that you slightly agree or strongly agree?
☐ Slightly agree
☐ Strongly agree
- No → ASK: Would you say that you slightly disagree or strongly disagree?
☐ Slightly disagree
☐ Strongly disagree
- Don't know → ☐
- Refused → ☐

Appendix 4

Infant Feeding Scale

Interviewer says: Next, I have some questions about what your baby has been eating lately

In the following questions we would like you to tell us about your baby's eating habits. Please tell me if the statement is: Yes or No (Interviewer: Circle only one answer for each food.)		
1. Has your baby ever had anything to eat other than formula or breast milk?	YES	NO
2. Has your baby ever had anything to drink other than formula or breast milk?	YES	NO
3. Have you started feeding your baby any solid foods?	YES	NO
4. If yes, how old was your baby when you first started doing this?	_____ Months	
5. If no, do you give your baby a little "taste" of food? (e.g. rice cereal on your finger?)	YES	NO
6. Do you ever feed your baby a bottle with a little cereal mixed with formula or breast milk in it?	YES	NO
7. If yes, how old was your baby when you started doing this?	_____ Months	
Tell me about your baby:		

8. Which of the following things can your baby do? Please tell me **all** that apply:

- ☐ Open mouth for breast or bottle
- ☐ Follow objects and sounds with eyes
- ☐ Put hand in mouth
- ☐ Sit with support
- ☐ Bring objects to mouth and bite them
- ☐ Hold bottle without support
- ☐ Drink from a cup that is held

What Has Your Baby Been Eating Lately?


For the following questions, please tell me each item that describes your baby. (Interviewer: Circle **all** that apply)

9. What does your baby take to bed?	<div style="display: flex; justify-content: space-around;"> Bottle Blanket </div> <div style="display: flex; justify-content: space-around;"> Pacifier Stuffed Toy </div> <div style="display: flex; justify-content: space-around;"> Other object_____ Takes nothing to bed </div>	
10. How does your baby use his/her bottle or cup between meals?	Carries it around during the day.	Has it while in the stroller.
	Has it while in the car seat.	Other* _____

Interviewer says: Once Your Baby Has Started Eating Solid Foods


For the following sections, we would like to know what you offer your baby during a week, once your baby has started eating solid foods. Please tell us **how often** in a week that you offer your baby the types of foods listed in the columns by placing a check mark (✓) in the column that best describes how often you offered your baby that food. Note to data collector, for babies 6 months of age, ask the participant if her baby has started eating any of the foods in that category first. If yes, go through each item; if no, mark rarely/never for each item and go to next food category and repeat the process.

For a typical week, **how often** do you offer your baby the following foods, checking one answer for each food.


Cereals and Grains 	Rarely / Never	1-3 times per week	4 or more times per week
Example: How often does your baby eat peas?	✓		
10. Baby Cereal			
11. Unsweetened breakfast cereal (for example: cheerios, oatmeal, cream of wheat)			
12. Sweetened breakfast cereal (for example: fruit loops, lucky charms)			
13. Bread, rolls, rice, pasta, or cereal bars			


What Has Your Baby Been Eating Lately?


Interviewer says: During a typical week, **how often** do you offer your baby the following foods, (Interviewer: check one answer for each food.)


Vegetables 	Rarely/ Never	1-3 times per week	4 or more times per week
14. Vegetable baby food			
15. Potatoes (mashed, boiled, baked)			
16. Fried potatoes/French fries (NOT fast food)			
17. Orange Vegetables (Such as carrots, and sweet potatoes)			
18. Green Vegetables (Such as spinach, broccoli, green beans, peas)			
19. Other kinds of Vegetables			


Interviewer says: For a typical week, **how often** do you offer your baby the following foods. (Interviewer: check one answer for each food.)

Dairy 	Rarely/ Never	1-3 times per week	4 or more times per week
20. Cheese			
21. Yogurt			
22. Cow's milk (Not breast milk/ formula)			

Fruit 	Rarely/ Never	1-3 times per week	4 or more times per week
23. Fruit baby food			
24. Any other fruits (canned/ fresh)			

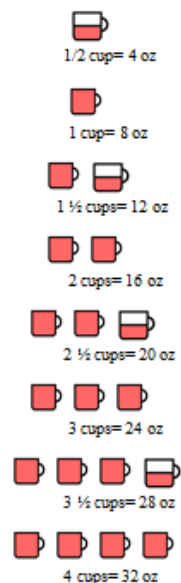
Fast Foods 	Rarely/ Never	1-3 times per week	4 or more times per week
25. Fast food (such as chicken nuggets, French fries)			

Meat, Fish, Eggs and Beans 	Rarely/ Never	1-3 times per week	4 or more times per week
26. Meat baby food			
27. Meat (including beef, pork, chicken)			
28. Processed meats (bologna, sausage, ham, bacon)			
29. Fish			
30. Eggs			
31. Beans (such as pinto, black, kidney, navy, etc...)			

Snacks 	Rarely/ Never	1-3 times per week	4 or more times per week
32. Donuts, biscuits, muffins, cakes, pie, cookies, brownies			
33. Milk desserts (ice cream, pudding)			
34. Candy			
35. Chips, crackers, popcorn, pretzels			
36. Nuts			

Think about a typical day in the past week when answering these questions. (Interviewer: circle only <u>One Answer</u> for each)							
Section A							
37. Usually, where is your baby during feeding/eating?	Lap	High chair	Booster seat	Car/ Infant seat	Walker	Regular Chair	Crawling or walking around
38. How much do you consider mealtime a chance to spend time with your baby and family?	No, not at all	Not really.	Somewhat a time to talk.	Pretty much	Very much		
39. How enjoyable or stressful is mealtime with your baby?	Very stressful	Stressful	A little enjoyable and a little stressful	Enjoyable	Very enjoyable		
How Often.... Section B							
40. Is the TV on where your baby can see it while feeding/eating?	1 Hardly ever	2 Some of the time	3 Most of the time	4 Almost all the time			
41. Does your baby look at or listen to the TV while feeding/eating?	1 Hardly ever	2 Some of the time	3 Most of the time	4 Almost all the time			
42. Is the baby with the family while the family is eating?	1 Hardly ever	2 Some of the time	3 Most of the time	4 Almost all the time			
43. Do you feed your baby yourself?	1 Hardly ever	2 Some of the time	3 Most of the time	4 Almost all the time			
44. Does your baby eat with his/her fingers?	1 Hardly ever	2 Some of the time	3 Most of the time	4 Almost all the time			
45. Does your baby use a spoon or fork?	1 Hardly ever	2 Some of the time	3 Most of the time	4 Almost all the time			
46. Does your baby use a sippy cup?	1 Hardly ever	2 Some of the time	3 Most of the time	4 Almost all the time			
47. Does your baby use a regular cup?	1 Hardly ever	2 Some of the time	3 Most of the time	4 Almost all the time			
48. Does your baby drink from a bottle?	1 Hardly ever	2 Some of the time	3 Most of the time	4 Almost all the time			
49. Do you sit with your baby while she/he eats?	1 Hardly ever	2 Some of the time	3 Most of the time	4 Almost all the time			
50. Does your baby play with toys while eating?	1 Hardly ever	2 Some of the time	3 Most of the time	4 Almost all the time			

Section A							Section B
Interviewer says: Please tell me how many times per day your baby drinks this beverage by checking the answer that best describes your baby. (Interviewer: Check only one box for each beverage listed. Circle if her baby drinks from a bottle, sippy cup or regular cup.)							Below, please indicate how much (in ounces) your baby drinks in one typical day.
	Never	A few times a week	Once a day	2-3 times a day	4 or more times a day	Is the drink in a bottle, sippy cup, or regular cup? (Circle one)	
Example: Tea			✓			Bottle <u>Sippy cup</u> Regular cup	4 oz
57. Breast Milk						Breast Bottle Sippy cup Regular cup	
58. Formula						Bottle Sippy cup Regular cup	
59. Cow's Milk						Bottle Sippy cup Regular cup	
60. 100% Fruit Juice						Bottle Sippy cup Regular cup	
61. Fruit Drink: Kool-aid, Hi-C, Sunny D						Bottle Sippy cup Regular cup	
62. Regular Soda (Not diet)						Bottle Sippy cup Regular cup	
63. Diet Soda						Bottle Sippy cup Regular cup	
64. Water						Bottle Sippy cup Regular cup	



Section A (cont)						Section B (cont)	
Below please tell me how many times per day your baby drinks this beverage by checking the answer that best describes your baby. (Interviewer: Check <u>only one</u> box for each beverage listed. Circle if her baby drinks from a bottle, sippy cup or regular cup.)						Below, please indicate how much (in ounces) your baby drinks in one typical day.	
65. Other: _____ _____ _____						Bottle Sippy cup Regular cup	

Section C		
Interviewer: Ask the mother if she drinks any of these beverage at least 2-3 times per week? Check all that apply		
	YES	NO
Example: Tea	✓	

66. Cow's Milk		
67. 100% Fruit Juice		
68. Fruit Drink: <u>Kool-aid</u> , Hi-C, Sunny D, etc.		
69. Regular Soda (not diet)		

70. Diet Soda		
71. Water		
72. Coffee		
73. Tea		
74. Other _____		

Appendix 5

Infant Feeding Styles Questionnaire

Infant Feeding Questionnaire (BEHAVIOR)

I will read a set of statements that refer to feeding (name of baby). These statements are neither right nor wrong. We just want to know your opinion. Some of these statements may seem similar but are actually different so please listen carefully.

GIVE PARTICIPANT THE NEVER-ALWAYS RESPONSE CHART AS GUIDE. GO THROUGH THE RESPONSE CHART READING THE CORRESPONDING RESPONSE TO EACH. *Tell me which response best describes how you feel about the statement. I will repeat the response back to you just to make sure I have it recorded correctly. If I ask you about feeding a certain food item which you have not yet given to (name of baby) please let me know.*

RESPONSE OPTIONS

- 1- Never
- 2- Seldom
- 3- Half of the time
- 4- Most of the time
- 5- Always

- 97 I Don't Know
- 98 Chose not to answer
- 99 Not applicable (i.e., food item not yet fed to baby)

STATEMENTS	RESPONSE							
First let's talk about <u>your baby</u> .	Never (1)	Seldom (2)	Half of the time (3)	Most of the time (4)	Always (5)	Doesn't know (97)	Chose not to answer (98)	Not Applicable (99)
1. I let (name of baby) decide how much to eat.								
2. When (name of baby) has/had a bottle, I prop/propped it up.								

3. I allow (name of baby) to drink soda or sugared drinks to stop him/her from crying or being fussy.								
4. (Name of baby) watches TV while being fed or eating.								
5. I keep track of how much (name of baby) eats.								
6. I keep track of what food (baby) eats.								
7. I give/gave (name of baby) cereal in the bottle.								
8. I carefully control how much (name of baby) eats.								
9. I watch TV while feeding (name of baby).								
10. I am very careful not to feed (name of baby) too much.								
11. (Name of baby) knows when s/he is full.								
12. Name of baby knows when s/he is hungry.								
13. I try to get (name of baby) to finish his/her breast milk or formula								
14. I try to get (name of baby) to finish his/her food.								

15. I allow (name of baby) to drink soda or sugared drinks to keep him/her happy.								
16. When (name of baby) cries, I immediately feed him/her.								
17. If (name of baby) seems full, I encourage him/her to finish his/her food anyway.								
18. I allow (name of baby) to drink soda or sugared drinks to make sure s/he gets enough.								
19. I talk to (name of baby) to encourage him/her to drink his/her formula or breast milk.								
20. I try to get (name of baby) to eat even if s/he not hungry.								
21. I insist (name of baby) re-try a new food refused at same meal.								
22. I praise (name of baby) after each bite to encourage him/her to finish food.								
23. I let (name of baby) eat fast food.								
24. I pay attention when (name of baby) seems to be telling me that s/he is full or hungry.								

25. I allow (name of baby) to eat when s/he is hungry.								
26. (Name of baby) lets me know when s/he is hungry.								
25. (Name of baby) lets me know when s/he is full.								
26. I talk to (name of baby) to encourage him/her to eat.								
27. I show (name of baby) how to eat by taking a bite or pretending to.								
28. I let (name of baby) eat junk food.								
29. I will retry giving new foods to (name of baby) if they are rejected at first.								
30. I allow (name of baby) to eat fast food if s/he wants.								
31. I allow (name of baby) to watch TV during feeding or while eating to make sure s/he gets enough.								
32. I allow (name of baby) to watch TV while feeding or eating to keep him/her happy.								
33. I allow (name of baby) to eat desserts/sweets if s/he wants.								
34. I allow (name of baby) to watch TV during feeding or while eating if s/he wants.								

35. I allow (name of baby) to eat fast food to make sure to make sure s/he gets enough								
36. I make sure (name of baby) does not eat sugary food like candy, ice cream, cake or cookies.								
37. I allow (name of baby) watch TV while feeding or eating to keep him/her from crying.								
38. I make sure (name of baby) does not eat junk food like potato chips, Doritos and cheese puffs.								
39. I allow (name of baby) to eat desserts/sweets to keep him/her from crying.								
40. I allow (name of baby) to drink sugared drinks/soda if s/he wants.								
41. I allow (name of baby) to eat fast food to keep him/her happy.								
42. I allow (name of baby) eat desserts/sweets to keep him/her happy.								
43. I allow (name of baby) to eat desserts/sweets to make sure s/he gets enough.								
44. I allow (name of baby) to eat fast food to keep him/her from crying.								

Infant Feeding Questionnaire (BELIEFS)

I will now read a set of statements. These statements are neither right nor wrong. We just want to know your opinion. Some of these statements may seem similar but are actually different so please listen carefully.

Please tell me how strongly you agree or disagree with each statement. GIVE PARTICIPANT THE DISAGREE-AGREE RESPONSE CHART AS GUIDE. GO THROUGH THE RESPONSE CHART READING THE CORRESPONDING RESPONSE TO EACH. Tell me which response best describes how you feel about the statement. I will repeat the response back to you just to make sure I have it recorded correctly.

RESPONSE OPTIONS:

- 1- Disagree
- 2- Slightly disagree
- 3- Neither disagree nor agree
- 4- Slightly agree
- 5- Agree
- 97 I don't know
- 98 Chose not to answer

STATEMENTS	RESPONSE						
<i>Let's talk about babies... when I say BABY I'm referring to babies from birth to 12 months</i>	Disagree (1)	Slightly Disagree (2)	Neither Agree or Disagree (3)	Slightly Agree (4)	Agree (5)	Doesn't Know (97)	Chose not to answer (98)
1. When a baby cries it usually means he or she needs to be fed.							
2. A baby less than 6 months old needs more than formula or breast milk to be full.							
3. I think it is okay to prop a baby's bottle.							
4. Putting cereal in the bottle is good because it helps a baby feel full.							
5. The best way to make a baby stop crying is to feed him or her.							
6. It's important for the parent to decide how much a baby should eat.							
7. It's important that a baby finish all of the milk in his or her bottle.							
8. A baby less than 6 months needs more than formula or breast milk to sleep through the night.							

9. A baby should never eat fast food.							
10. Cereal in bottle helps a baby sleep thru the night.							
11. The best way to make a baby stop crying is to feed.							
12. A baby knows when s/he is full.							
13. It's important to help or encourage a baby to eat.							

14. A baby knows when he/she is hungry and needs to eat.							
--	--	--	--	--	--	--	--

STATEMENTS	RESPONSE						
<i>Let's talk about toddlers... when I say TODDLER I'm referring to children 1 to 3 years old.</i>	Disagree (1)	Slightly Disagree (2)	Neither Agree or Disagree (3)	Slightly Agree (4)	Agree (5)	Doesn't Know (97)	Chose not to answer (98)
15. Toddlers should be allowed to watch TV while eating to keep them from crying.							
16. Toddlers should be allowed to eat fast foods to keep them from crying.							
17. Toddlers should be allowed to eat fast food to make sure they get enough.							
18. Toddlers should be allowed to watch TV while eating to keep them happy.							
19. Toddlers should be allowed to eat desserts/sweets to make sure they get enough.							
20. Toddlers should be allowed to drink sugared drinks/soda to keep them happy.							
21. Toddlers should be allowed to eat desserts/sweets if they want.							
22. Toddlers should be allowed to drink sugared drinks/soda to make sure they get enough.							

Appendix 6

Maternal Knowledge and Self Efficacy Scales

Feeding Babies

(Knowledge) **INTERVIEWER SAYS:** Now I will ask you some questions about feeding babies. Please tell me what you think about the following statements: **YES, NO** or **Don't Know**

1. Babies' bodies are not ready for solid foods before about 4 months of age.	YES	NO	Don't Know
2. Babies who are given solid foods before 4 months may have more food allergies later on.	YES	NO	Don't Know
3. When a baby can hold his/her head steady, it means he might be ready for solid foods.	YES	NO	Don't Know
4. When a baby can sit with support, it usually means she is ready for solid foods.	YES	NO	Don't Know
5. The baby should decide how much to eat during a feeding .	YES	NO	Don't Know
6. The mother should decide how much the baby eats during a feeding.	YES	NO	Don't Know
7. Before a baby learns to like a new food, he might have to try the food 10-20 times.	YES	NO	Don't Know
8. The baby should decide whether to eat or not during a feeding.	YES	NO	Don't Know
9. A baby's temperament influences how she acts during feeding.	YES	NO	Don't Know
10. If a baby has strong reactions to things, like crying really loud and long, he is not trying to be difficult.	YES	NO	Don't Know
11. If a baby gets fussy during feedings, she/he is not trying to be stubborn.	YES	NO	Don't Know

12. Babies talk with their bodies by giving cues. Please circle those cues or behaviors that may mean a baby is hungry.

Falling asleep

Putting hands to mouth

Sucking on fist or fingers

Arching back

Turning to parent

Turning head away

Pushing back

13. When should you start giving your baby solid foods? When the baby is between:

0 and 1 month

1 and 2 months

2 and 3 months

4 and 6 months

INTERVIEWER SAYS: Please tell me how sure (confident) you feel about the following statements.

I am sure....	Very Sure (5)	Sure (4)	Neither Sure or Unsure (3)	Unsure (2)	Very Unsure (1)
1. I can start feeding different foods to my baby at the right age.	5	4	3	2	1
2. I can be a good role model for my baby by eating healthy foods.	5	4	3	2	1
3. I can let my baby decide whether or not to eat.	5	4	3	2	1
4. I can let my baby decide how much to eat.	5	4	3	2	1
5. I can change how I feed my baby to match his temperament.	5	4	3	2	1
6. I have a lot to do with how smoothly feedings go with my baby.	5	4	3	2	1
7. I can tell when my baby is letting me know he or she is full.	5	4	3	2	1

Appendix 7

Pictorial Assessment of Temperament

The Pictorial Assessment of Temperament (PAT)

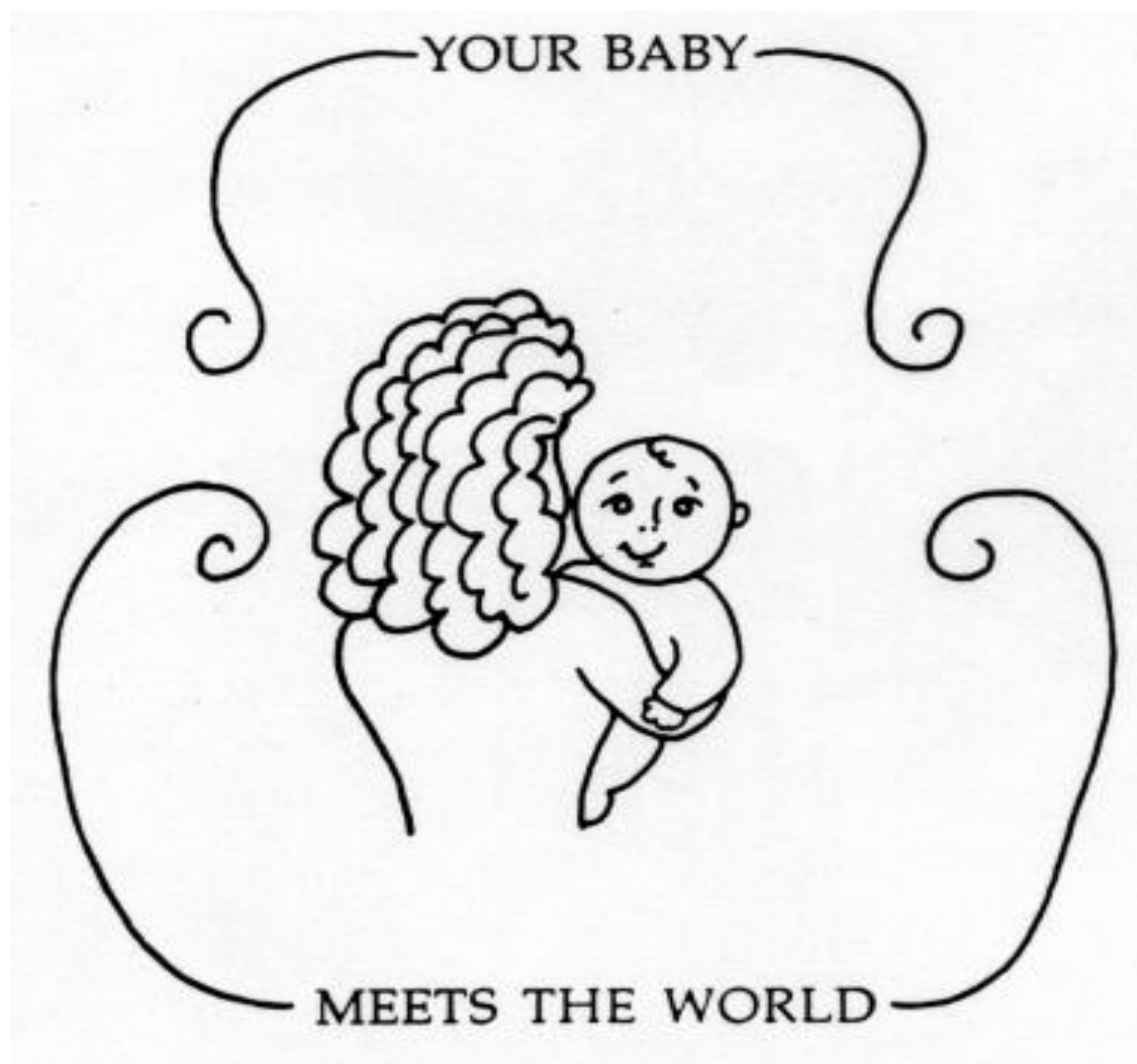
Version 1.0

2000

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Illustrations by Kathleen Cosby

University of California at Irvine

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In this booklet are a number of situations that babies often go through.

Different babies react differently to these situations.

Here we show cartoon pictures of three different reactions to each situation.

Please think about how *YOUR BABY* usually reacts to each of these situations.

Then pick which of the three cartoon examples is *most like* how he or she behaves.

Is your baby like:

“Baby X” or

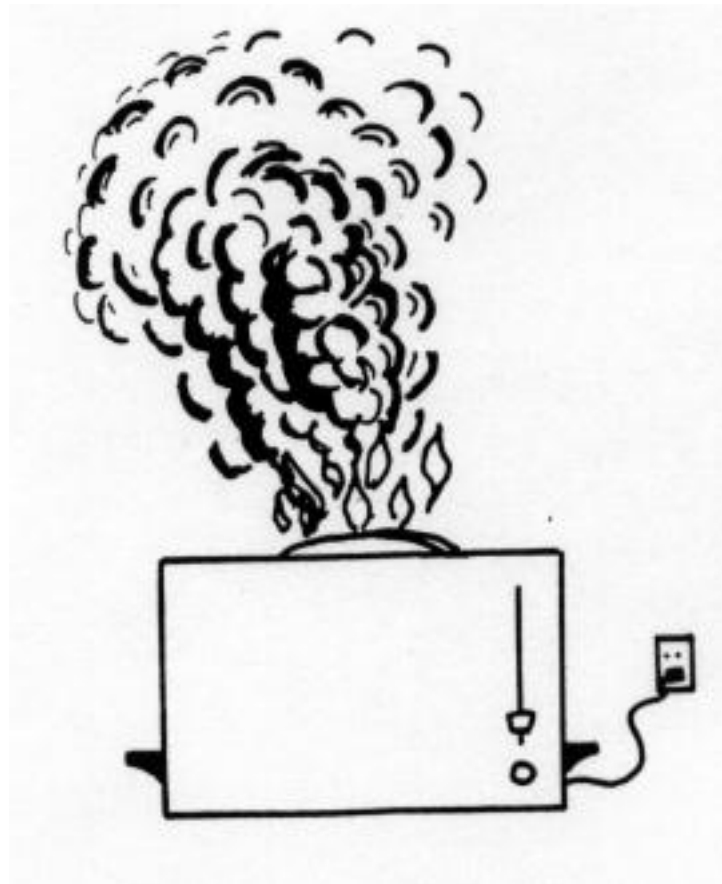
“Baby Y” or

“Baby Z” ?

Circle your answer on each page.

SITUATION 1:

The Burning Toast



You are feeding baby, and after a few minutes, an emergency suddenly arises! The toast is burning! You have to interrupt baby's feeding.

How does baby react?

AT FIRST...



A BIT LATER...

Baby X



Baby Y

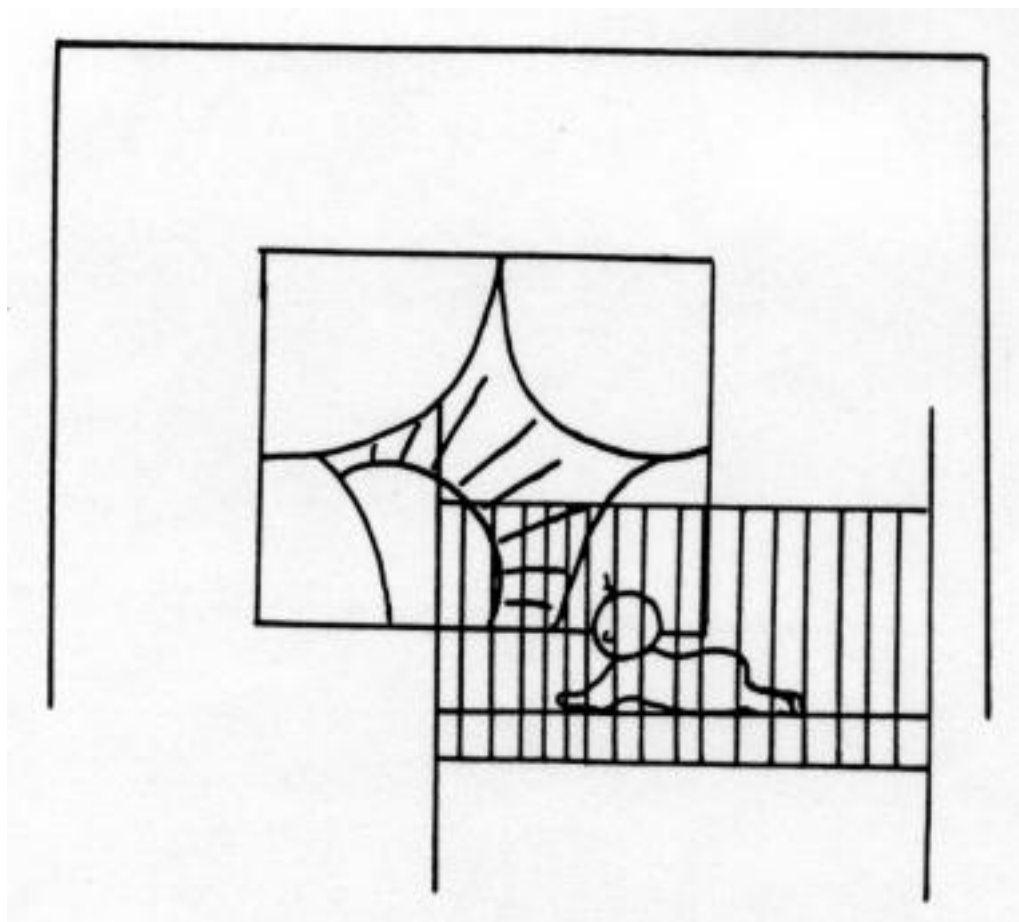


Baby Z



SITUATION 2:

Waking Up



When baby first wakes up in the morning...

How does baby react?

AT FIRST...



A BIT LATER...

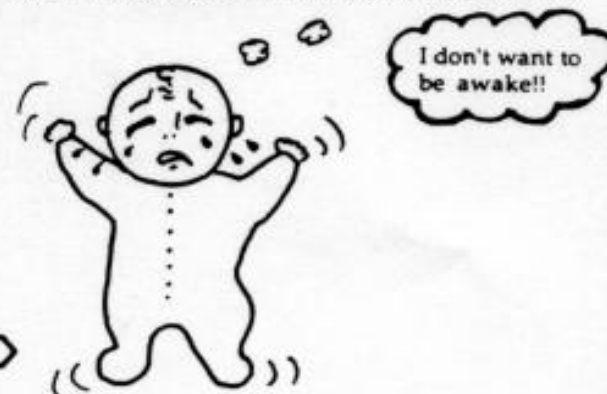
Baby X



Baby Y



Baby Z



SITUATION 3:

The Face Washing



When you wash baby's face with a wet washcloth...

How does baby react?

AT FIRST...



A BIT LATER...

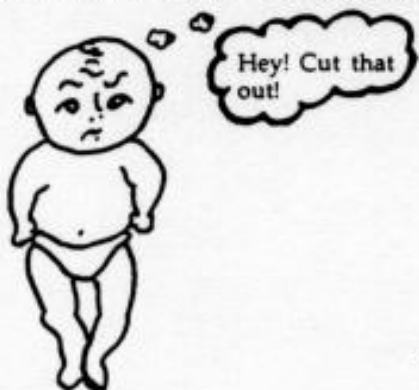
Baby X



Baby Y

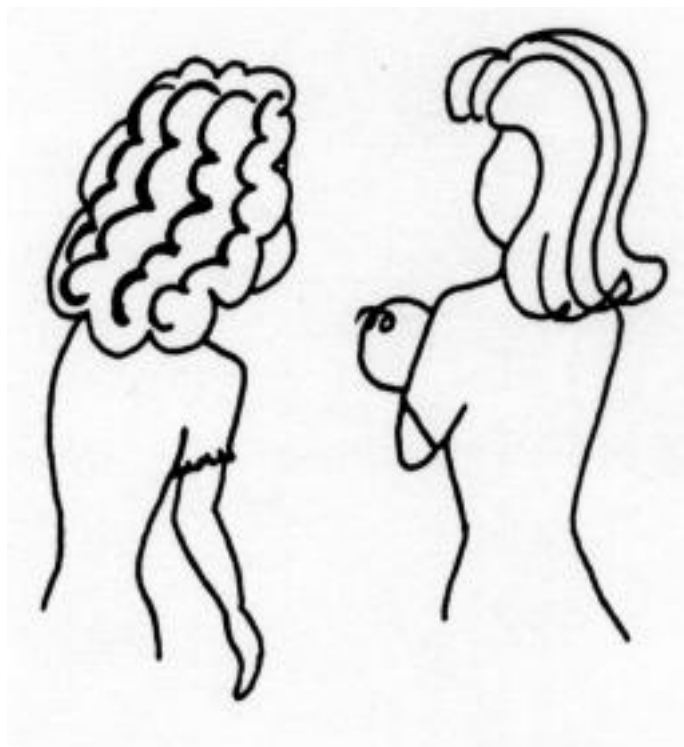


Baby Z



SITUATION 4:

In a Stranger's Arms



You give baby to a stranger to hold while you are busy.

How does baby react?

AT FIRST...



A BIT LATER...

Baby X



I like this person!



This is fun!

Baby Y



I'm not so sure about this person...



Well, I guess she's okay.

Baby Z



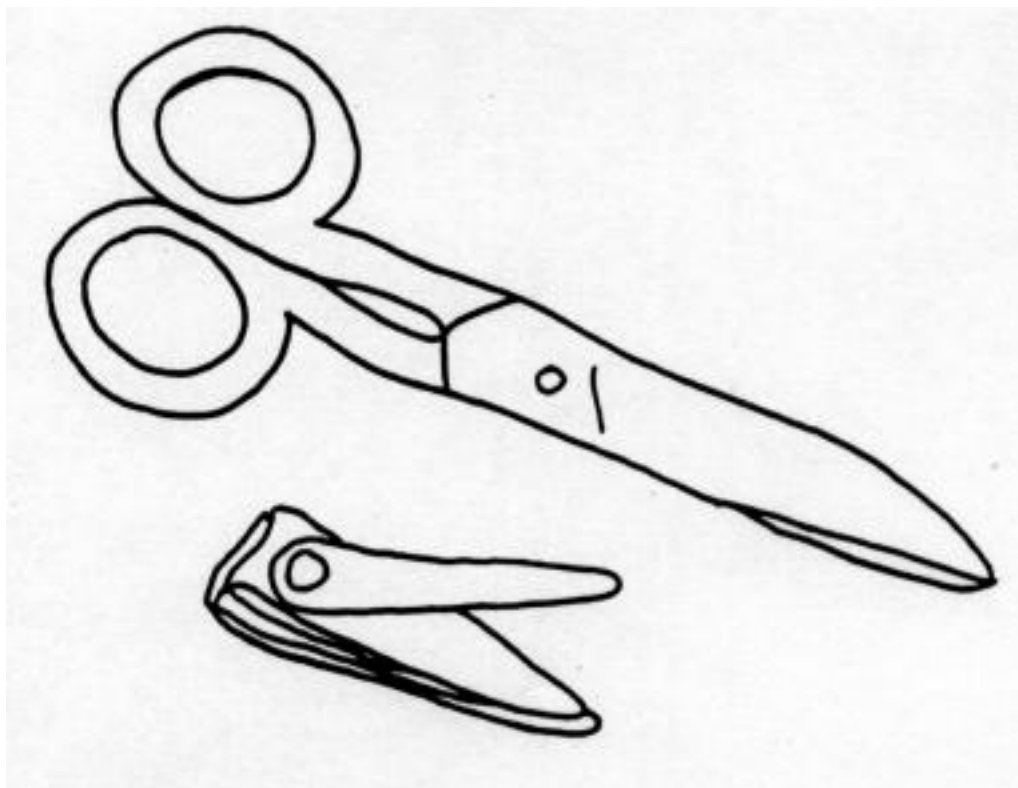
I don't think I like this...



I want my Mommy back now!!

SITUATION 5:

The Manicure



When you cut baby's nails...

How does baby react?

AT FIRST...



A BIT LATER...

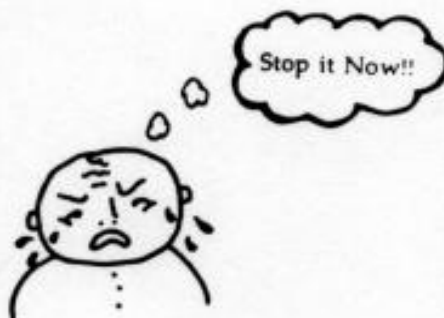
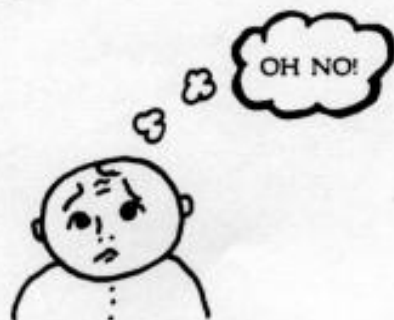
Baby X



Baby Y

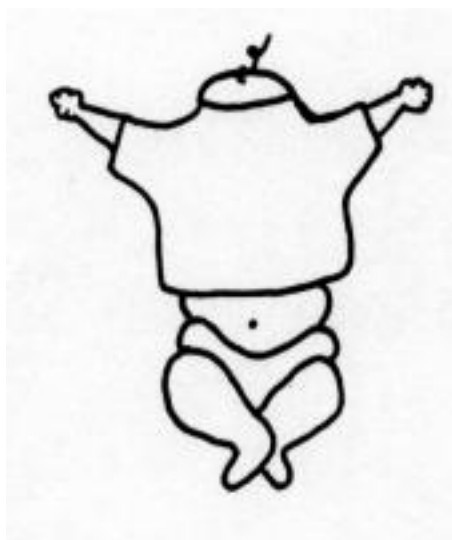


Baby Z



SITUATION 6:

Getting Dressed



When you put a shirt on over baby's head...

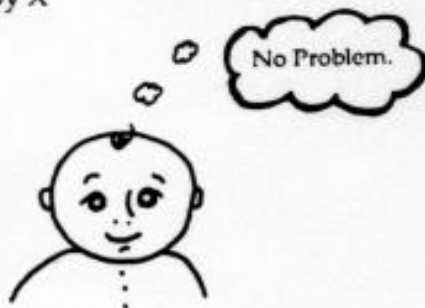
How does baby react?

AT FIRST...



A BIT LATER...

Baby X



Baby Y

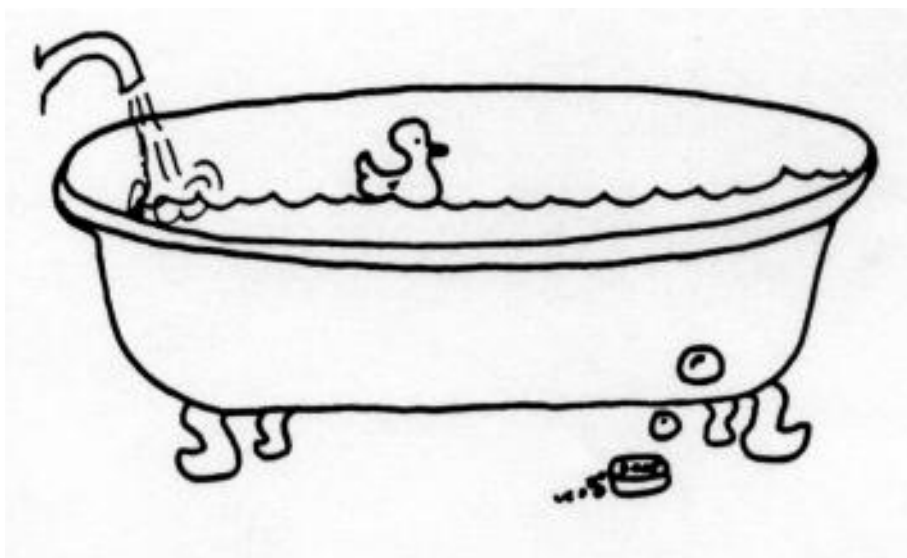


Baby Z



SITUATION 7:

The Bath



When you give baby a bath, in warm water...

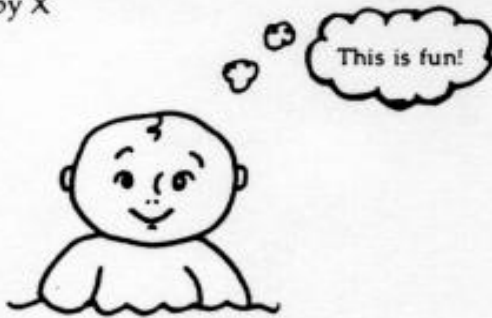
How does baby react?

AT FIRST...



A BIT LATER...

Baby X



Baby Y



Baby Z



SITUATION 8:

The Big Bang



Baby hears a sudden loud noise!

How does baby react?

AT FIRST...



A BIT LATER...

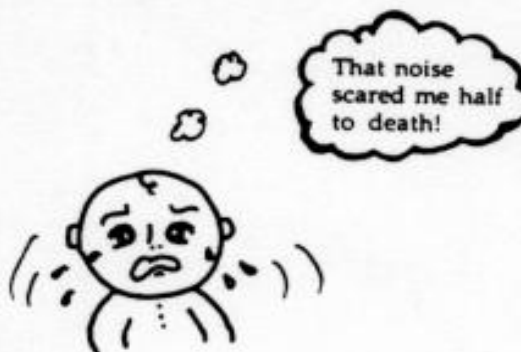
Baby X



Baby Y

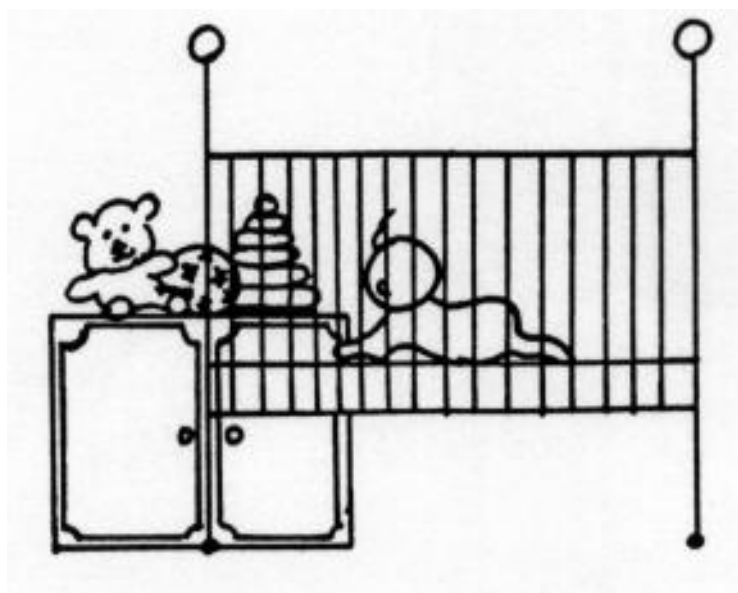


Baby Z



SITUATION 9:

Alone at Last



When you put baby down for a nap while he or she is still awake and you leave baby alone in the crib...

How does baby react?

AT FIRST...



A BIT LATER...

Baby X



Baby Y

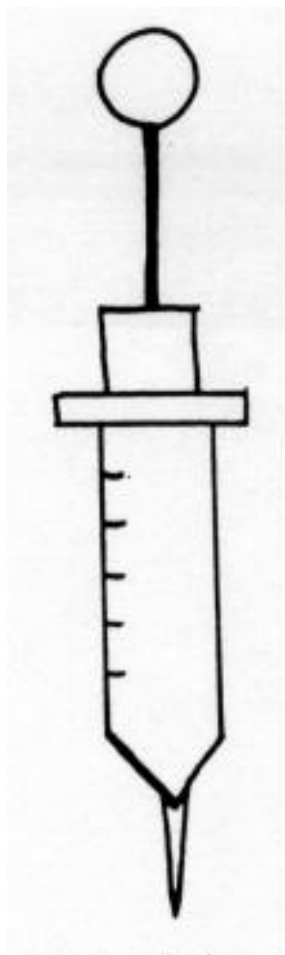


Baby Z



SITUATION 10:

The Needle



The doctor gives baby an injection.

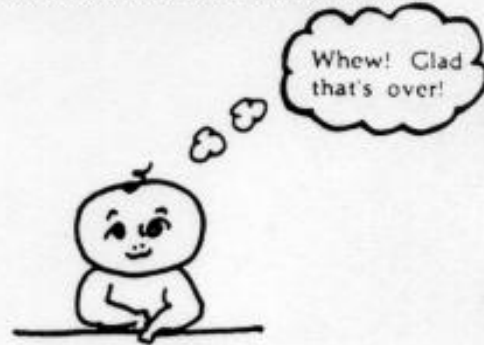
How does baby react?

AT FIRST...



A BIT LATER...

Baby X



Baby Y



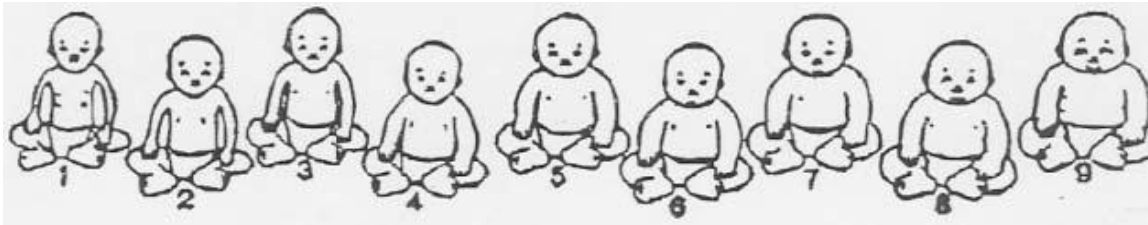
Baby Z





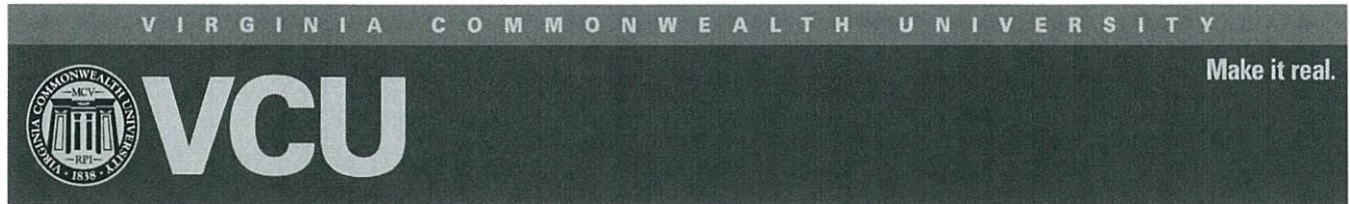
Appendix 8

Baby Rating Scale (BRS)



Appendix 9

VCU IRB Approval



Office of Research Subjects Protection
BioTechnology Research Park
BioTech One, 800 E. Leigh Street, Suite 3000
P.O. Box 980568
Richmond, Virginia 23298-0568
(804) 828-0868
(804) 827-1448 (fax)

DATE: February 27, 2013

TO: Suzanne W. Ameringer, PhD, RN
School of Nursing
Box 9802 12

FROM: Lisa M. Abrams, PhD
Chairperson, VCU IRB Panel B
Box 980568

J
y
L. B.
L. A.

RE: VCU IRB #: HM14939
Title: Infant Feeding Practices and Beliefs of Latina Mothers

On February 25, 2013, the following research study was approved by expedited review according to 45 CFR 46.110 Category 7. This research involves children and is approved under 45 CFR 46.404. The approval reflects the revisions received in the Office of Research Subjects Protection on February 13, 2013. This approval includes the following items reviewed by this Panel:

RESEARCH APPLICATION/PROPOSAL: None

PROTOCOL (Research Plan): Infant Feeding Practices and Beliefs of Latina Mothers, received 2/13/13, version date 1/26/13

- VCU IRB Study Personnel Roster, received 2/13/13, version date 2/8/13
- Infant Feeding Styles Questionnaire, received 2/13/13, version date 1/26/13
- Sign-In Sheet, received 2/13/13, version date 1/26/13
- Baby Rating Scale (BRS), received 12/8/12, version date 12/11/12
- Latina Mothers Child Feeding Practices Questionnaire (LMCFPQ), received 12/18/12, version date 12/11/12
- Maternal Knowledge and Self-Efficacy Scale (MKSES), received 12/18/12, version date 12/11/12
- Pictorial Assessment of Temperament (PAT), received 12/18/12, version date 12/11/12
- Infant Feeding Scale (IFS), received 12/8/12, version date 12/11/12

HIPAA PROCESS:

**The following pathway for accessing and/or using PHI has been approved:*

- Signed Authorization combined with Informed Consent

CONSENT/ASSENT (attached):

- Research Subject Information and Consent Form, received 2/13/13, version date 1/26/13, 4 pages

ADDITIONAL DOCUMENTS (attached):

- Potential Participant Script, received 12/18/12, version date 12/11/12
- Tear-Off Flyer: Infant Feeding Study, received 12/18/12, version date 12/11/12

(Continued ...)

Please Note: The VCU IRB acknowledges receipt of the YCU IRB Appendix A: HIPAA for Research form on February 13, 2013.

This approval expires on January 31, 2014. Federal Regulation s/VCU Policy and Procedures require continuing review prior to continuation of approval past that date. Continuing Review report forms will be mailed to you prior to the scheduled review.

The Primary Reviewer assigned to your research study is Lou Usry, RN. If you have any questions, please contact Ms. Usry at lusry@mcvh-vcu.edu and 828-9229; or you may contact Jennifer Rice, IRB Coordinator, VCU Office of Research Subjects Protection, at irbpanelb@vcu.edu and 828-3992.

[Attachment – Conditions of Approval]

Conditions of Approval:

In order to comply with federal regulations, industry standards, and the terms of this approval, the investigator must (*as applicable*):

1. Conduct the research as described in and required by the Protocol.
2. Obtain informed consent from all subjects without coercion or undue influence, and provide the potential subject sufficient opportunity to consider whether or not to participate (unless Waiver of Consent is specifically approved or research is exempt).
3. Document informed consent using only the most recently dated consent form bearing the VCU IRB "APPROVED" stamp (unless Waiver of Consent is specifically approved).
4. Provide non-English speaking patients with a translation of the approved Consent Form in the research participant's first language. The Panel must approve the translated version.
5. Obtain prior approval from VCU IRB before implementing any changes whatsoever in the approved protocol or consent form, unless such changes are necessary to protect the safety of human research participants (e.g., permanent/temporary change of PI, addition of performance/collaborative sites, request to include newly incarcerated participants or participants that are wards of the state, addition/deletion of participant groups, etc.). Any departure from these approved documents must be reported to the VCU IRB immediately as an Unanticipated Problem (see #7).
6. Monitor all problems (anticipated and unanticipated) associated with risk to research participants or others.
7. Report Unanticipated Problems (UPs), including protocol deviations, following the VCU IRB requirements and timelines detailed in VCU IRB WPP Vill-7:
8. Obtain prior approval from the VCU IRB before use of any advertisement or other material for recruitment of research participants.
9. Promptly report and/or respond to all inquiries by the VCU IRB concerning the conduct of the approved research when so requested.
10. All protocols that administer acute medical treatment to human research participants must have an emergency preparedness plan. Please refer to VCU guidance on <http://www.research.vcu.edu/irb/guidance.htm>.
11. The VCU IRBs operate under the regulatory authorities as described within:
 - a) U.S. Department of Health and Human Services Title 45 CFR 46, Subparts A, B, C, and D (for all research, regardless of source of funding) and related guidance documents.
 - b) U.S. Food and Drug Administration Chapter I of Title 21 CFR 50 and 56 (for FDA regulated research only) and related guidance documents.
 - c) Commonwealth of Virginia Code of Virginia 32.1 Chapter 5.1 Human Research (for all research).

010507

RESEARCH SUBJECT INFORMATION AND CONSENT FORM

TITLE: Infant feeding practices and beliefs of Latina mothers
VCU IRB NO.: HM 14939



INVESTIGATOR: Diana Cartagena, RN, CPNP

SPONSOR: the Virginia Commonwealth University School of Nursing is sponsoring this study.

This consent form may contain words that you do not understand. Please ask the study staff to explain any words that you do not clearly understand. You may take home an unsigned copy of this consent form to think about or discuss with family or friends before making your decision.

PURPOSE OF THE STUDY

The purpose of this research study is to examine the infant feeding practices and beliefs of Latina mothers. You are being asked to participate in this study because you are a Latina mother of a healthy infant who is in the range of 4 to 12 months old.

DESCRIPTION OF THE STUDY AND YOUR INVOLVMENT

If you decide to be in this study, you will be asked to sign this consent form after your questions have been answered and you fully understand what will occur during the study.

In this study you will be asked to participate in an interview that will take place in a private place or your home, whichever you choose. Each interview will take approximately 1 hour and 30 minutes. If the interview is not completed during the first visit, you will be asked to complete the interview during a second visit. Approximately 90 mothers will participate in this study.

In addition, if you agree to participate in the study, your infant's medical records will be reviewed by the study's staff to obtain the infant's height and weight from birth to now. This information will be collected for the purpose of this study only.

RISKS AND DISCOMFORTS

You do not have to answer questions that you do not want to answer.

BENEFITS TO YOU AND OTHERS

You may not get any direct benefit from this study, but the information from this research study may lead to a better understanding of feeding practices and beliefs of Latina mothers.

COSTS

There are no costs for participating in this study other than the time you spend completing the interview.

Version: 1-26-13

Page 1 of 4

APPROVED
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PAYMENT FOR PARTICIPATION

After you complete the interview, you will receive a \$20.00 gift card compensation for your time and effort.

ALTERNATIVES

Your alternative is to not participate in the study.

CONFIDENTIALITY

Potentially identifiable information about you will consist of screening questions and questionnaires, plus data from your child's medical records. Data is being collected only for research purposes. All of the study documents will be identified with identification numbers, not names, and stored separately from consent forms. All of the documents will be stored in a locked office, and only study staff will have access to these documents. All personal identifying information will be kept in password-protected files, and these files will be deleted in 7 years after the study ends.

We will not tell anyone about the answers you give us; however, information from the study and from your child's medical records and the consent form you signed may be looked at or copied for research purposes by Virginia Commonwealth University.

What we find from this study may be presented at meetings or published in papers, but your name will never be used in these presentations or papers.

VOLUNTARY PARTICIPATION AND WITHDRAWAL

You do not have to participate in this study. If you choose to participate, you may stop at any time without any penalty. You may also choose not to answer particular questions that are asked of you in this study. Your decision to withdraw will involve no penalty or loss of care, service, or benefits to which you are otherwise entitled from the agency.

Your participation in this study may be stopped at any time by the study staff or the sponsor without your consent. The reasons might include:

- The study staff thinks it necessary for your health or safety;
- You have not followed study instructions;
- Administrative reasons require your withdrawal.

QUESTIONS

In the future, you may have questions about your participation in this study. If you have any questions, complaints, or concerns about the research, contact:

Diana Cartagena, RN, CPNP

PhD Candidate, School of Nursing

APPROVED

2-25-13 / LU / JRL

Virginia Commonwealth University
Box 980567
Richmond, VA 23298
(757) 218-3832 English and Spanish line

Suzanne Ameringer, PhD, RN
Assistant Professor, Department of Family and Community Health
Nursing School of Nursing

Virginia Commonwealth University
Box 980567
Richmond, VA 23298
(804) 628-7551 office

If you have any questions about your rights as a participant in this study, you may contact:

Office for Research
Virginia Commonwealth University
800 East Leigh Street, Suite 113
P.O. Box 980568
Richmond, VA 23298
Telephone: 804-827-
2157

Do not sign this consent form unless you have had a chance to ask questions and have received satisfactory answers to all of your questions. Additional information about participation in research studies can be found at <http://www.research.vcu.edu/irb/volunteers.htm>.

Consent to Participate

I have been given the chance to read this consent form. I understand the information about this study. Questions that I wanted to ask about the study have been answered. My signature says that I am willing to participate in this study. I will receive a copy of the consent form once I have agreed to participate.

Participant name printed

Participant signature

Date

Name of Person Conducting Informed Consent
Discussion /Witness
(Printed)

Signature of Person Conducting Informed Consent
Discussion / Witness

Date

Principal Investigator Signature (if different from above)

Date

POTENTIAL PARTICIPANT SCRIPT



1. If the potential participant is reached:

"Hello, my name is Diana Cartagena. I am a researcher at the Virginia Commonwealth University School of Nursing. I received your name from the staff at the WIC (or CDR) office. I am doing the study on infant feeding practices and beliefs of Latina mothers."

"I am talking with you (or calling), because I understand you might be interested in knowing more about our study?"

"Are you still interested in hearing more at this time?"

2. *"First, can I ask you a few questions to see if you are eligible to participate in the study?" Are you:*

- 1. Immigrant Latina mother*
- 2. 18 years of age or older*
- 3. Mother of an infant aged anywhere from 4 to 12 months*
- 4. Mother of an infant eligible to receive WIC*
- 5. Mother of an infant with NO history of prematurity or low-birth weight*
- 6. Mother of no multiple births*

3. If she is **ineligible**

"I'm sorry, but because (state reason for ineligibility), we cannot enroll you in this study. But thank you so much for your time and interest."

4. If she is **eligible**

"It is a study that looks at reasons why Latina mothers decide when and how to feed their infants"

"You will be asked to complete an interview that will take approximately 1 hour and 30 minutes. The interview will take place in a private location or your home, whichever you choose."

"Your participation in the study may help us to understand the feeding practices and beliefs of Latina mothers in order to develop better ways to feed infants that we hope will eventually improve the health of Latino babies"

5. If she **does NOT** want to participate

"Thank you for your time and have a great day"

If she **would like to participate and she is eligible**

Proceed to consent form.

Version: 12-11-12

Page 2 of 2

APPROVED

2-25-13 / LU / JRC



APPROVED

2-25-13 / LU / JRC

Infant Feeding Study

Diana Cartagena, RN, CPNP at Virginia Commonwealth University School of Nursing is conducting a research study to learn about the feeding practices and beliefs of Latina mothers

You may be eligible to participate in this study if you:

- Are a Latina mother
- Have a baby who is between 4 to 12 months old

Volunteers will be compensated for participating

Call 757-218-3832 for more information

Diana Cartagena
(757) 218-3832

Diana Cartagena
(757) 218-3832

Diana Cartagena
(757) 218-3832

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Diana Cartagena
(757) 218-3832

Appendix 10

VDH Approval Letter



COMMONWEALTH of VIRGINIA

Cynthia C. Romero, MD, FAAP
State Health Commissioner

Department of Health
P O BOX 2448
RICHMOND, VA 23218

TTY 7-1-1 OR
1-800-828-1120

March 7, 2013

Suzanne Ameringer, Ph.D., RN
Assistant Professor, School of Nursing
Virginia Commonwealth University
1100 East Leigh Street
Richmond, Virginia 2398-0567

Dear Dr. Ameringer:

Study #:	40172
Study Title:	Infant Feeding Practices and Beliefs of Latina Mothers
Principal Investigator:	Suzanne Ameringer, Ph.D., RN
Type of Review:	Expedited


This letter is to advise you that the above referenced study has been reviewed by the Virginia Department of Health (VDH) Institutional Review Board (IRB) and has been approved.

A Continuation Review form will need to be completed and returned annually for all ongoing research projects; a reminder letter and form will be sent to you six weeks prior to the March 7, 2014 annual review due date. A brief study summary report is to be submitted to the VDH IRB within 90 days of the conclusion of the research project.

Expected adverse events (those noted on the consent form) need not be reported to the VDH IRB on an individual basis. At the time of continuation review, the principal investigator should report the incidence of these adverse events. If, in the course of conducting the study, the principal investigator finds that the expected adverse events are occurring with a greater frequency or at a higher level of severity than expected, or if there is an occurrence of an unanticipated adverse event, he/she should report this to the VDH IRB within ten business days of when this finding is noted. Finally, the death of any study subject should be reported immediately to the VDH IRB. The only exception is when the study is conducted among subjects who are expected to have a high rate of mortality from their underlying condition, and the investigator has absolutely ruled out any connection between any study procedure and the subject's death.

Should the project undergo substantial changes (e.g., changes in the consent procedure, addition of potentially sensitive items to research instruments, changes in treatment procedure) in the protocol or subject population, another request for IRB review must be filed.

On behalf of the members of the VDH IRB, I wish you well on your research project.


Ph.D., MPH
Chair, VDH IRB

Vita

Diana Cristina Cartagena was born in Medellin, Colombia, S. A. I am a Pediatric Nurse Practitioner working for the Children Hospital of King's Daughters of Virginia in an off site general pediatric practice, Pediatric Associates of Williamsburg in Williamsburg, Virginia.

During my long nursing career, I have worked in diverse outpatient and inpatient clinical settings as well as in the military and academia. I am passionate about promoting children's healthy growth and development. One of my research interests is in the area of obesity among Latino infants and children.

I received a Bachelors of Science in Nursing from the University of South Florida in Tampa, Florida in 1984. Shortly after graduation, I joined the United States Air Force Nurse Corps. After six years of active duty service, I returned to school and obtained a Master of Science in Nursing and certification as Pediatric Nurse Practitioner from the University of Colorado, Denver in 1995. I have taught at the Northwestern State University School of Nursing and Louisiana State University Medical Center in Shreveport, Louisiana.

Most recently, I was responsible for the development, expansion, and marketing of School-Based Health Centers (SBHC) in Newport News, Virginia. I was involved in recruitment of eligible school age children and their siblings to participate and benefit from services at the SBHC. I implemented health promotion programs such as an evidence-based asthma management and prevention program for children, and healthy nutrition and fitness program for teachers and staff. I was instrumental in the planning and execution of these programs and several countywide initiatives to promote healthy school environments in Virginia. My extensive work experience with vulnerable and underserved populations inspires me to study and research the factors that lead to childhood obesity in Hispanics.