The Impact of Puerto Rican Maternal-feeding Practices

on Child Obesity Prevention and Development

BY

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THESIS

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This dissertation is dedicated to many special people that grace my life with love and positive encouragement. First, to my loving husband, Ivan, whose unconditional love, unwavering support and motivation has given me the strength to continue to persevere academically and professionally. I share this accomplishment with my daughter, Anjelica, who has patiently endured the interferences that my graduate studies and dissertation have presented throughout her entire life. She has been my inspiration to see this journey to fruition! I also want to dedicate this amazing accomplishment to my wonderful parents: Louis and Digna for their patience, encouragement, and understanding throughout the many years that I have been working to making this dream a reality. The foundation my parents provided me of a strong work ethic and value for education have allowed me rise above life's challenges with character and a positive attitude. This project is also dedicated to the next generation of scholars, my nieces and nephews: Nathan, Amanda, Jailene, Justin, Ariza, Nicholas, Josen, and Jacen. May they be encouraged by the endless possibilities afforded to them through education. Finally, I also acknowledge my aunt Carmen for being an inspiration and a fountain of support.

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LIST OF ABBREVIATIONS

AAP   American Academy of Pediatrics

BMI   Body Mass Index

BSPR   Biculturality Scale for Puerto Ricans

CBO   Community-Based Organization

CC   Child-Centered

CDC   Centers for Disease Control and Prevention

CDPH   Chicago Department of Public Health

CFPQ   Child-feeding Practices Questionnaire

CFQ   Child-feeding Questionnaire

CHIS   California Health Interview Survey

CI   Confidence Intervals

CLOCC   Consortium to Lower Obesity in Chicago Children

COW   Greater Humboldt Park Community of Wellness

CVD   Cardiovascular Disease

DEC   Diabetes Empowerment Center

HHANES   Hispanic Health and Nutrition Examination Survey

HP   Humboldt Park

HPCHS   Humboldt Park Community Health Survey

IQR   Interquartile Range

NHANES   National Health and Nutrition Examination Survey

OR   Odds Ratio

PC   Parent-Centered

PFQ   Preschooler Feeding Questionnaire

PRCC   Puerto Rican Cultural Center

PSE   Perceived Self-Efficacy

SAS   Statistical Analysis System

SCT   Social Cognitive Theory

SES   Socioeconomic Status

SPSS   Statistical Package for the Social Sciences

T2D   Type 2 Diabetes

USDA   United States Department of Agriculture

WC   Waist Circumference

SUMMARY

Childhood obesity impacts a third of all American children. Racial and ethnic minority groups in the United States have higher prevalence rates of overweight and obesity in comparison to their White counterparts. Specifically, Puerto Rican children in the Chicago Humboldt Park (HP) community are disproportionately affected by obesity, which manifests in poorer health outcomes (Estarziau et al., 2006). Among the contributors of obesity, parental sociocultural and socioeconomic factors play an important role in shaping early childhood health behavior, which predisposes children to obesity risk (Savage, Fisher, & Birch, 2007). However, research assessing Latina child-feeding strategies in relation to child obesity is limited and extant literature is primarily centered on the experiences of Mexican Americans, which is not generalizable across Latino subgroups. Namely, the impact of Puerto Rican child-feeding styles on obesity risk is poorly understood. As the second largest Latino subgroup in the United States, it is important to understand the different experiences, perceptions, and beliefs of Puerto Ricans in relation to acculturation and engagement in risky behavior.

Thus, this study employed a descriptive cross-sectional survey design to assess Puerto Rican maternal child-feeding practices in order to tailor ethnically appropriate programs that will promote healthy lifestyles. A purposive sample of 100 mothers-child pairs (47 boys and 53 girls) recruited from early childhood centers and community centers in HP participated in the study from May 2011 to December 2011. Participants were recruited from six early childhood centers. Data analyses were performed using the Statistical Package for the Social Sciences (SPSS) version 20 and Statistical Analysis System (SAS) version 9.2. Most of the women in this study were single (67%), had at least some college education or a college degree (67%), were employed (70%), and had an income greater than $20,000 (67%) with a median household size

of four. The majority of the women in the study were born in the United States (83%), had lived

in the United States more than 20 years (median=27 years), and were bilingual (89%) and

bicultural (70%) first-generation Puerto Ricans (66%).

The findings revealed that the majority of the Puerto Rican mothers were categorically

overweight or obese (71% body mass index [BMI] ≥25; 62% waist circumference [WC] ≥88cm).

However, for the corresponding children, findings varied depending on the metric used, whereby

71% of the children had a healthy weight based on BMI percentiles (5th–< 85th percentile), but

57% were at risk for overweight based on WC (≥75th percentile). This study revealed that child

anthropometry for Puerto Rican preschool children in HP was influenced by child-feeding

practices, child dietary intake, maternal anthropometry, and demographic characteristics.

Analyses determined that practicing child control, pressure to eat, and restriction for weight may

increase the risk for overweight among Puerto Rican children. Overweight children were more

likely to consume sweet snacks, to be females, to have overweight mothers, to come from larger

households, and to have older siblings. Maternal WC may be a better predictor of child

overweight risk given that child WC was correlated with maternal WC.

This study uncovered potential protective factors against child overweight prevention.

Puerto Rican mothers reported child-centered (CC) health-promoting practices more prevalently

than parent-centered (PC) health-compromising practices. Children of mothers who practiced

health-promoting approaches consumed fewer sweetened drinks and sweets and ate more fruits.

Puerto Rican women who refrained from rewarding their children with unhealthy snacks had

children who consumed more vegetables as snacks. Women who were older, more educated, and

had higher incomes practiced in more protective CC methods. In addition, frequently eating family meals together was also protective. Beneficial health-promoting child-feeding practices include providing dietary balance and variety, providing a healthy food environment at home, teaching about nutrition, and involving children in meal planning and preparation. On the other hand, women who practiced PC strategies had children who consumed more sweetened drinks, juices, and fast foods. Women who were employed as well as younger women may promote the practice of risky child-feeding behaviors. The PC methods that may pose health-compromising risks include using food for emotional regulation, using food as rewards, pressuring children to eat more food, and restricting foods for weight control.

Among the acculturation indicators, years of residence in the United States and the Biculturality Scale for Puerto Ricans (BSPR) influenced both CC and PC maternal child-feeding practices. Findings suggest that Puerto Rican women who have a longer exposure to American culture (i.e., longer length of stay in the United States) or identify more with American culture (i.e., American-dominant) practiced both PC and CC child-feeding practices, while Puerto Rican-dominant women practiced only PC strategies. Thus, acculturation may have an effect on both health-promoting and health-compromising behaviors. Specifically, acculturation may benefit the promotion of maternal encouragement of a balanced diet and provision of a healthy dietary environment. However, acculturation may increase health risks associated with the practices of reward and pressure, particularly among children of women who are culturally Puerto Rican-dominant. Women who were Puerto Rican-dominant also had children who consumed more juice and fried potatoes, which may increase the risk for child overweight. Child WC was significantly related to Puerto Rican cultural dominance, while acculturation status

SUMMARY (continued)

predicted child overweight for both BMI and WC. Analyses determined that acculturation strengthened the relationship between maternal child-feeding practices and child overweight when WC was used as a measure. Thus, using the BSPR in this study contributed to the understanding of the effect of acculturation on child-feeding behavior, dietary intake, and child overweight.

This study supports the potential influence of maternal child-feeding practices on child overweight in the HP community. Future educational interventions should emphasize the risks associated with pressuring children to eat given that this domain predicted child overweight for both of the anthropometric indicators used. The use of food as a reward mechanism should also be cautioned. In addition, more research is needed to understand the effect of child control and monitoring on child overweight. Maternal practices in this study contradict existing research. Specifically, child control in this study was found to be unfavorable, while monitoring may be protective. It is also important to consider cultural differences when targeting future research and educational interventions in this community. Thus, findings inform policy development and best practices for structuring and implementing future obesity prevention intervention programs tailored to Puerto Rican populations.

I. INTRODUCTION

This chapter provides an introduction to the purpose of this research investigation. The chapter discusses the research problem based on the influence of maternal child-feeding practices on childhood obesity among Puerto Ricans in Chicago. The significance of the problem of childhood obesity among Puerto Ricans is considered as well as the significance of the study findings in addressing child obesity and promoting practices that will foster prevention. Finally, the specific aims of the study are outlined.

A.   **Statement of the Problem**

   1.   **Prevalence of childhood obesity**

The increased prevalence in childhood overweight rates has reached epidemic proportions leading physicians to claim that the new generation of children may be the first to die 10 to 20 years prematurely (Pratezina, 2002). Among American preschoolers two to five years of age, the number of overweight children has nearly tripled since the 1970s (Centers for Disease Control and Prevention [CDC], 2007a), and poses serious health risks including high blood pressure, high cholesterol, Type 2 diabetes (T2D), and asthma as well as psychological issues such as stress, poor body image, low self-esteem, and depression. In particular, minority racial and ethnic groups in the United States are disproportionately affected by overweight and obesity with Latino children representing higher prevalence rates. Specifically, Mexican American children have the highest rate of overweight (21.8%) in comparison to their White counterparts (12.3%; CDC, 2005). This corresponds with higher morbidity rates for T2D and metabolic disorders among Latino children (Ariza et al., 2004; Daniels et al., 2005). Thus, the problem of overweight among children has become a public health priority as overweight

increasingly affects children at younger ages. In accordance with the Healthy People 2020 goals of eliminating health disparities and improving quality of life, overweight is among the ten leading health indicators. The cost of disease burden from obesity-related health care expenses amount to an estimated annual sum of $350 million (Oster et al., 2000). Although there are numerous contributing factors to obesity from genetic predisposition to environmental determinants, behavioral factors (e.g., energy intake, physical activity, and sedentary lifestyle) are more proximal to the individual locus of control (Davison & Birch, 2001). Parental influence plays an important role in shaping early childhood health behavior, particularly dietary habits, because parents determine their children's food choices, quantities, and availability (Savage, Fisher, & Birch, 2007).

2. **<u>Latina maternal health and behavior</u>**

Latinos are the largest "minority" ethnic group in the United States and comprise the majority in some major U.S. cities. However, research conducted on the behavioral factors that impact Latino health and childhood obesity is limited (Suarez-Orozco & Paez, 2002). Culture influences human health and behavior, and shapes life experiences. Ethnicity may also affect how individuals view and respond to infirmity, health, diet, physical activity, and body image as well as the patterns of care they seek. Geographic culture also influences health. As immigrants attempt to assimilate to a new culture, they may adopt behaviors that are harmful to their health and incongruent with their traditional cultural practices (Abraido-Lanza, Chao, & Florez, 2005). For example, a study of Latinos in the United States who were U.S. natives or residents for more than 15 years revealed that highly acculturated Latinos were more likely to become overweight or obese, which is less prominent among recent immigrants or individuals in their native countries (Lara et al., 2005). In addition, research on Latina women has identified a

personal preference for thinness for themselves (Contento, Basch, & Zybert, 2003), but a fuller figure image for their children, especially for children under eight years of age (Johnson & Birch, 1994).

3. **<u>Child-feeding practices</u>**

Maternal child-feeding practices can best be summarized by distinguishing between PC and CC feeding strategies (Hughes et al., 2006). Parent-centered feeding strategies have been found to be more coercive and more likely to replace children's internal feelings of satiation with external cues that may promote increased intake of specific foods that are restricted (e.g., junk food). Because food restriction has been associated with overeating, it is also predictive of increased weight gain as measured by higher BMI rates (Faith et al., 2003) and risk for overweight or obesity; and may be health-compromising. Conversely, pressuring children to eat more can manifest in an inverse relationship with food intake (Galloway et al., 2006) and hence lower BMI scores (Faith et al., 2003; Galloway et al., 2006).

Innate feelings of satiation can be supported through CC feeding strategies including self-reliance and monitoring. The literature suggests that strategies can promote child self-regulation of food intake and are good predictors of reduced fat intake (Bourcier et al., 2003) and lower BMI scores (Faith et al., 2004b). However, there are mixed results in studies that observe the association between parental control during child feeding and child weight (Johannsen, Johannsen, & Specker, 2006), which may indicate that more research may be necessary to delineate the relationship between CC feeding practices and their effect on reducing BMI, WC, and the risk for overweight.

Mothers may be able to promote child health by supporting their children's feelings of satiation, but most do not believe their children when they say they are satisfied or full and encourage them to eat more (Sherry et al., 2004). Among Latinas, there is a greater likelihood for mothers to exert high control to encourage child feeding, particularly pressure to eat more (Hughes et al., 2006). However, research observing Latina maternal-feeding strategies to prompt eating is limited and the relationship between Latina maternal-feeding practices and overweight is poorly understood. Further research is needed to understand the relationship between Latina mothers' concerns over child health and child-feeding practices and to uncover how these may impact overweight.

B.   **Significance of the Problem**

The alarming exponential increase in childhood overweight and diabetes among Latinos calls for uncovering behavioral and sociocultural determinants that may impact early childhood weight outcomes. As gatekeepers and role models, maternal health behavior, practices, and attitudes influence child behavior, weight status, and subsequent health outcomes. Specifically, traditional maternal child-feeding practices (e.g., restricting palatable foods) have been attributed to child overeating (Faith et al., 2004a), even in the absence of hunger (Birch, Fisher, & Davison, 2003), and overweight (Faith et al., 2004a). Among Latinas, a cultural preference for heavier children (Johnson & Birch, 1994) as an indicator of good health (Diaz, Mainous, & Pope, 2007) may parallel feeding practices that promote overconsumption among children (e.g., restriction) (Hughes et al., 2006). In addition, mothers who are overweight are more likely to consume energy-dense foods, and more likely to have children who are overweight (Ogden et al., 2002). Overweight children are at greater risk of developing a host of health problems including hypertension and high blood cholesterol and glucose levels, which are strong predictors for

cardiovascular disease (CVD) and T2D (Ogden et al., 2002). Overweight children are also more susceptible to developing gallbladder disease, many forms of cancer, and sleep and digestive disorders, and may die prematurely (Berk, 2008). In addition, Latino children have been found to have higher rates of insulin resistance, T2D mellitus, and metabolic syndrome as well as obesity-related liver disease (Stovitz et al., 2008). Dietary experiences in early childhood develop a foundation for long-term lifestyle dietary practices that influence overweight (Briley & Roberts-Gray, 1994). Evidence suggests that food preferences are shaped by a child's early experiences with foods (Savage, Fisher, & Birch, 2007). In particular, early childhood (two to five years of age) is one of the most influential periods of development for establishing protective health behaviors throughout the life course (Halfon & Hochstein, 2002). However, there is limited research that observes maternal child-feeding practices among Latinos as these influence early childhood health and weight outcomes. Thus, it is important to assess the behavioral and sociocultural determinants that may be manifested in the higher rates of overweight across Latino subgroups.

C.   Significance of the Study

In order to address childhood obesity and its related comorbidities, it is important to understand the influence of child-feeding behavior on energy intake and weight, particularly during preschool years when children begin to experiment with different foods and self-feeding as they begin to transition to adult foods (Savage, Fisher, & Birch, 2007). Maternal cultural and socioeconomic factors (e.g., education, employment status, and income) may place children at risk for becoming overweight and obese during the early years. In addition, mothers' perceptions and concerns about weight, diet, and health influence child-feeding practices and child-eating patterns (Savage, Fisher, & Birch, 2007). In particular, maternal child-feeding practices are the

most influential factors for developing childhood eating behaviors (Savage, Fisher, & Birch, 2007). Among Latinas, there is a greater likelihood for mothers to exert high control to encourage child feeding, particularly pressure to eat more (Hughes et al., 2005). However, research observing Latina maternal strategies to prompt eating is limited and the relationship between Latina child-feeding practices and child obesity is poorly understood. As the population of Latinos continues to grow, it is necessary to develop ethnically appropriate dietary guidelines, education, and interventions to reduce adverse health effects of overweight; however, research on the relationship of child-feeding practices among Latinos is limited.

D.   **Specific Aims**

The primary aims of this study are:

1.   To determine the association between maternal child-feeding practices and:

  a.   Child anthropometric indicators using sex-specific BMI-for-age and WC

  b.   Child-feeding characteristics (e.g., child dietary intake), and

  c.   Maternal and child characteristics

2.   To determine the relationship between child anthropometric indicators using age- and sex-specific BMI and WC and:

  a.   Maternal anthropometric indicators

  b.   Child-feeding characteristics, and

  c.   Maternal and child characteristics

3.   To determine the association between Puerto Rican acculturation and:

  a.   Maternal child-feeding practices

  b.   Child-feeding characteristics, and

  c.   Child anthropometric indicators

E.   **Research Questions**

The following research questions will be addressed in relation to the specific aims described above.

1.   What are the maternal child-feeding practices employed by Puerto Rican mothers in the HP community of Chicago, Illinois?

2.   What is the dietary intake of preschool Puerto Rican children (ages two to five) from the HP community?

3.   Do maternal child-feeding practices impact early childhood dietary intake and related overweight or obesity among Puerto Ricans preschool children?

4.   What is the relationship between maternal and child anthropometric indicators for Puerto Rican mother-child pairs?

5.   What is the impact of child dietary intake and child anthropometric indicators among Puerto Rican children?

6.   What is the influence of maternal acculturation levels on Puerto Rican maternal child-feeding practices, child dietary intake, and child anthropometry?

7.   Does acculturation moderate the relationship between maternal child-feeding practices, child dietary intake, or child anthropometric measures (BMI and WC)?

II. CONCEPTUAL FRAMEWORK AND RELATED LITERATURE

This chapter provides a review of the literature of maternal child-feeding practices as it impacts childhood obesity among Puerto Ricans. As part of this discussion, a conceptual model is presented to explain the relationship between the variables being investigated in this study. Definitions for terminology used within the context of this study are provided. In addition, a review of the literature includes the following sections: (1) child anthropometric measures and obesity development; (2) parent-child bidirectional relationship and parenting styles; (3) maternal influence on eating behavior; (4) maternal acculturation, dietary behavior, child-feeding practices, and obesity; and (5) Puerto Rican historical perspective in the context of women. Limitations in the literature are also discussed.

A. **Conceptual Model for the Relationship of Maternal Child-feeding Practices on Child Anthropometrics**

Figure 1 illustrates the proposed conceptual model for this study to examine the influence of maternal sociocultural factors on child anthropometric indicators among Puerto Rican mothers of HP in Chicago, Illinois. The explanatory model outlines the interaction between maternal child-feeding practices, child dietary intake, maternal acculturation, maternal social support with child-feeding, maternal characteristics, and child weight status. The framework draws from the core constructs of the Social Cognitive Theory (SCT) (Bandura, 2001) to define contextual factors associated with child overweight and obesity as well as factors related to healthy child weight status.

Intervening Variables

Child eating behavior
Child dietary intake
Child physical activity
Sedentary behavior

Independent Variables

Maternal child-feeding practices
(e.g., modeling, involvement,
pressure, restriction)

Dependent Variables

Child anthropometric indicators
(sex-specific BMI-for-age,
and WC)

Moderating Variables

1. Maternal sociocultural factors (acculturation, generational status, residency, country of origin, perception of child health and weight, support with child feeding)
2. Maternal and child characteristics (age, weight status, sex of the child)
3. Maternal socioeconomic status (income, level of education, employment)

Figure 1. Conceptual model of child-feeding practices on child anthropometry.

1. **<u>Antecedents of maternal beliefs, knowledge, and skills that influence child-feeding practices</u>**

        Figure 2 represents a holistic perspective of the proposed theoretical framework, which describes the reciprocal relationship between the personal, behavioral, and environmental influences on health outcomes. The personal characteristics are reflected through antecedents, such as maternal beliefs, knowledge, skills, goals, and intentions that influence child-feeding strategies. Basic constructs of the SCT model of maternal beliefs, knowledge, and skills that impact child-feeding practices include perceived self-efficacy (PSE), behavioral capacity, and expectations. Bandura (1989) describes PSE as an individual's belief in his or her capability to perform a behavior and prevail over obstacles (e.g., barriers). Behavioral capacity refers to the individual having the adequate knowledge and skills to engage in protective behaviors. Expectations refer to the person's perceived outcomes (e.g., benefits or consequences) of performing a behavior and the values that the person places on that outcome. Mothers who have high self-efficacy should be well positioned to exercise health-promoting child-feeding practices and model relevant healthy eating behavior. However, high self-efficacy may be enhanced or countered based on whether a parent has or does not have the adequate knowledge and skills (behavioral capacity) about health-promoting feeding practices (Dunbar & Kranitz, 2004). Although not explicitly depicted in this model, self-efficacy and outcome expectations can have bidirectional impacts on behavior. For example, if the parent's outcome expectancy is to have a "healthy," full-figured child, they may be more confident in following feeding practices that promote overeating.
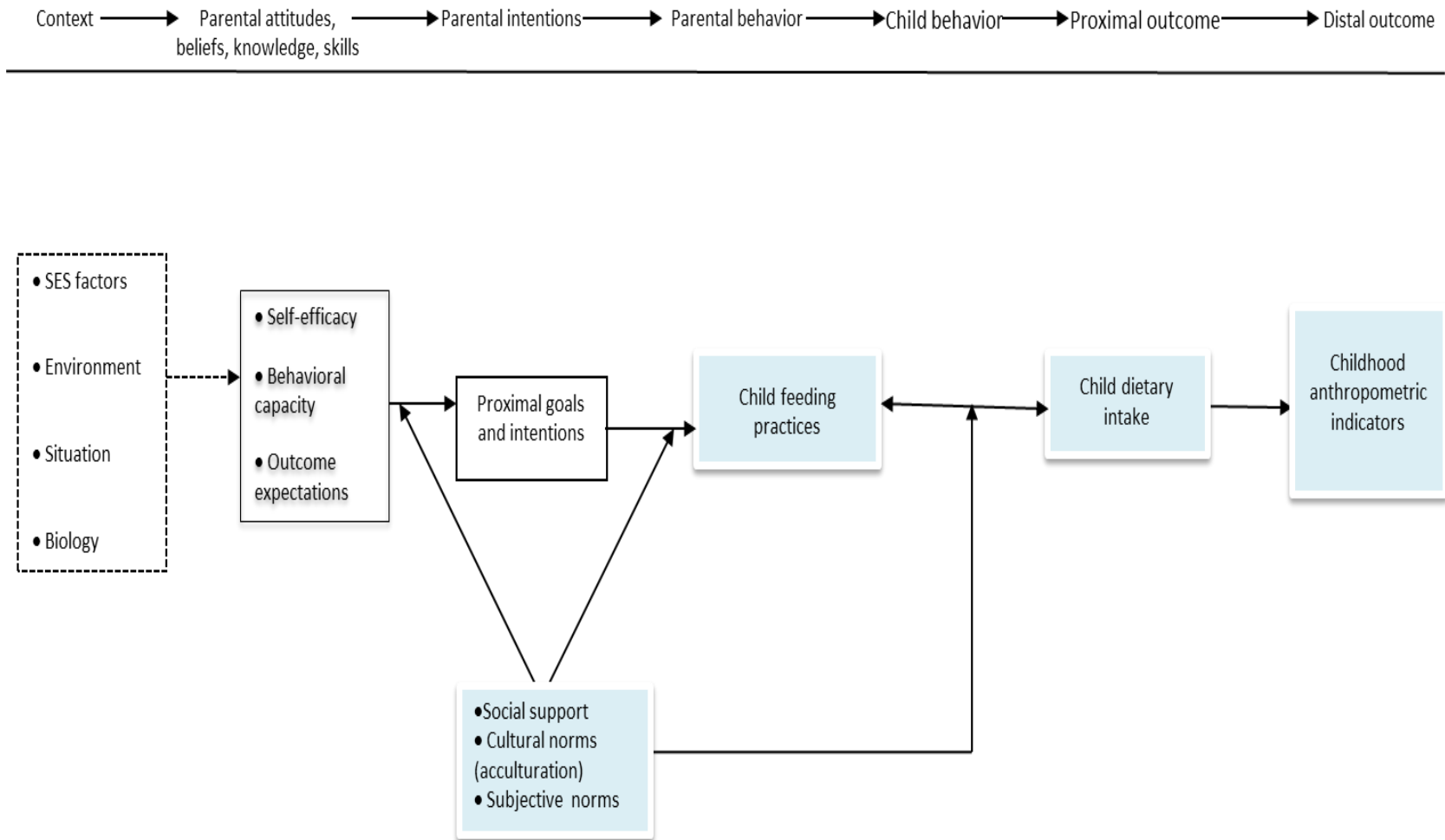
Figure 2. Theoretical framework of maternal influence on child diet and obesity development.

In addition, maternal perceptions regarding child health and weight, and dietary practices that may be culturally entrenched may impact maternal goals and intentions to engage in specific child-feeding practices. The SCT constructs that determine perceptions (e.g., PSE) are strong predictors of an individual's behavioral goals and intentions. The SCT defines two types of goals: long-term goals and proximal ones. Proximal goals are most closely attributed to behavior. The goal-setting theory has been used to observe parental goals to structure health-promoting behavior (e.g., increasing water consumption). Although the SCT does not explicitly include intentions, Bandura (2001) defined intentionality as a "future course of action to be performed" (p. 6). Specifically, the SCT has been used to assess goal-setting and healthy eating among parents of elementary school children (Sharma, Wagner, & Wilkerson, 2005–2006). Findings revealed that setting goals for hours of television watched by children predicted child self-control and knowledge about healthy eating practices (R^2=0.055). Literature assessing intentions related to health has focused primarily on exercise intention (Bourdreau & Godin, 2007), and does not report intentions related to nutrition behavior and feeding strategies. Empirical research observing goals and intentions among Latinos or cross-culturally have primarily studied intentions in the context of adolescent career development, mentoring, or sexual education (Byars & Hackett, 1998).

2. **Maternal child-feeding practices that influence child dietary intake and weight status**

Maternal behavior (i.e., child-feeding practices) in turn experientially shapes children's beliefs about food and impacts the child's eating, dietary, and physical activity responses. Maternal-feeding strategies operate as experiential and reinforcement mechanisms for children. Under the SCT, children adopt eating behavior through observational or vicarious

learning of parental behavior, such as child-feeding practices. Reinforcement occurs after the child performs an observed behavior that is praised or rewarded (e.g., rewarding the child with sweets or a treat after he cleans his plate). Holmbeck (1997) describes the interaction between experiential learning and behavior adoption as the "exposure effect," whereby a cumulative knowledge of observations and reinforcements may result in behavior (e.g., overeating) among children (Halfon & Hochstein, 2002). This may also explain why family members possess similar characteristics and behaviors (Baranowski, Perry, & Parcel, 2002).

As figures of authority, parents are viewed as opinion leaders to their children and hence parental behavior may play a salient role in tipping or turning points during the critical developmental periods that shape child behavior (Halfon & Hochstein, 2002) and influence decision-making to mimic the parent's behavior. In Latino culture, the value of authority and obedience parallel harsh feeding tactics employed by parents to encourage their child to eat (even in the absence of hunger), which may manifest in the child's overeating response (Arredondo et al., 2006) and hence overweight or obesity.

Maternal child-feeding strategies can best be summarized using PC and CC strategies (Hughes et al., 2005). Parent-centered strategies have been found to be more coercive and more likely to replace children's internal feelings of satiation with external cues that may promote increased intake of specific foods that are restricted. The PC strategies include control tactics, such as food restriction, pressure to eat, and negotiation and rewards to encourage eating. Because food restriction has been associated with overeating, it is predictive of increased weight gain, higher BMI rates (Faith et al., 2003), and risk for overweight or obesity. Restriction of foods has been demonstrated to increase consumptions of restricted foods and hence increase the risk for childhood overweight. When parents used food to control child behavior, children

reported greater dissatisfaction with their body size and image and were more likely to overeat (Brown & Ogden, 2004). Faith and colleagues (2003) found that Latina and African American mothers exerted more controlling (i.e., restrictive) tactics to manipulate child eating than their White counterparts. Among Latinas, there is a greater likelihood for mothers to exert high control to encourage child feeding, particularly pressure to eat more (Hughes et al., 2005). In addition, Latino children whose mothers exerted restrictive practices over eating were more likely to eat more unhealthy foods (Arredondo et al., 2006). However, research observing Latina maternal strategies to prompt eating is limited and the relationship between Latina maternal child-feeding practices and child overweight is poorly understood. Another study by Faith and colleagues (2004a) observing differences among child-feeding practices and weight found that restriction of food at age three predicted weight gain at age five among children at risk of becoming obese. Risk for obesity was determined by a family history of overweight or obesity. However, researchers determined that a mother's weight was associated with concern about her child's weight, but not with parenting practices (Faith et al., 2004a). Conversely, a review of the literature on restrictive parenting and childhood overweight found that restriction may be elicited by child overweight or risk for obesity and consequently sustains or exacerbates child overweight (Faith & Kerns, 2005).

Like restriction, pressure to eat has been associated with child weight status. Pressuring children to eat more can manifest in an inverse relationship with food intake (Galloway et al., 2006) and lower BMI scores (Faith et al., 2004; Galloway et al., 2006). A study observing the influence of pressure on food intake and weight repeated the presentation of two different soups to children while randomly exerting pressure to eat for one soup type (Galloway et al., 2003). When children were not pressured to eat, they had a greater intake of soup regardless of the

flavor (corn or pumpkin) than when they were pressured to eat. Unlike restriction, pressure to eat was associated with decreased food consumption and negative child response, such as refusal to eat. Pressure to eat was correlated with decreased child BMI scores. Similarly, results from the Child-feeding Questionnaire (CFQ) revealed that pressure to eat was an indicator for lower BMI rates among children at risk of becoming obese (Faith et al., 2004). Using a cross-cultural equivalency scale, Hughes and colleagues (2005) found that Latinos used more controlling strategies to pressure their child to eat when compared to African Americans. These strategies included demands, threats, and rewards and were known to increase the child's external orientation to food intake.

Parents of preschool children reported issues with child feeding and concerns over their children's portions and the types of foods children eat at mealtime or snack time (Hoerr, Utech, & Ruth, 2006). Consequently, parents may resort to negotiation and reward strategies during mealtime or snack time to encourage eating. For example, rewards to motivate children to eat by providing high-fat and/or high-sugar desserts or treats reinforce increased food intake and particularly the intake of unhealthy foods (Orrell-Valente et al., 2007). A study by Sherry and colleagues (2006) identified different dietary tactics employed by mothers cross-culturally to encourage eating. Researchers found that all parents used negotiation, such as accommodating meals to promote eating. However, parents were also likely to positively reinforce the consumption of sweets by using these as bribes, rewards, and pacifiers. This behavior was more common among middle-class White mothers. Low-income Latina mothers were more likely to use fruits as a "special treat," while low-income African American and Euro-American mothers were more likely to withhold drinks at meal until a desired amount of food had been eaten. Regardless of the variation of feeding strategies used by mothers, they were all generally

concerned about their children eating a healthful diet. Sherry and colleagues (2004) also found

that most mothers wanted to avoid child consumption of sweet and processed foods. However,

mothers did not clearly understand the recommended dietary guidelines.

Conversely, feelings of satiation can be supported through CC strategies including

modeling, self-reliance, and monitoring. Such strategies can promote child self-regulation of

food intake and are good predictors of reduced fat intake (Bourcier et al., 2003) and lower BMI

scores (Faith et al., 2004), which promote healthy weight status. Parental behavior influences

childhood development of eating habits (Sherry et al., 2004) through role modeling healthy

protective lifestyle behaviors. The ability of adults to role model self-regulation over "unhealthy"

food choices has a positive impact on children's self-control for healthful energy intake and

decreased body fat (Savage, Fisher, & Birch, 2007). Research observing the influence of

maternal modeling theories on child-eating behavior determined that parental role modeling was

significantly associated with child snack intake, eating motivation, and body dissatisfaction

(Brown & Ogden, 2004) as children mimic parental behavior. Mothers who consume more fruits

and vegetables were less likely to pressure their children to eat and their children were more

likely to model the behavior and less likely to be picky eaters (Galloway et al., 2005). Hence,

children of parents who modeled healthy eating practices were more likely to be satisfied with

their body image. When compared to maternal disinhibition, cognitive restraint has been

associated with Latina mothers' employment of health choices for themselves and their children

(Contento, Zybert, & Williams, 2005). Among Latinas, maternal disinhibition was associated

with overconsumption of foods high in fat and sugars by both the parent and the child. Parents

who were more indulgent had children who were twice as likely to be overweight than children

of parents who set boundaries and monitored eating (Hughes et al., 2007). Indulgent parents have

been found to perceive benefits of increased fruit and vegetable availability for their children at home (Hughes et al., 2007); however, researchers have found this practice to be more indicative of parental modeling of restraint (Savage, Fisher, & Birch, 2007).

Generally, there is less evidence observing the influence of parental encouragement of CC strategies. Extant literature has been less clear in consistently determining whether child self-regulation or self-reliance of food choices is beneficial. Some research implicated that parental encouragement of the child's self-regulation was a good predictor for reducing fat intake (Faith et al., 2004). This study also found that children who were allowed to self-regulate dietary intake were more likely to have lower BMIs; however, contrary findings indicated reduced BMIs among children of mothers who did not support child self-reliance (Faith et al., 2003). A cross-cultural study found that Latinas practiced more CC strategies in comparison to African Americans mothers (Hughes et al., 2005). Child-centered strategies promote internalization with food consumption framed by the child's satiety cues. Child-centered monitoring techniques are defined as reasoning, complimenting, and assisting children with feeding. Similarly, Arredondo and colleagues (2006) found that monitoring practices employed by Latina mothers were associated with children's healthful eating practices. However, Johannsen, Johannsen, and Specker (2006) did not find an association between exerting some parental control during child feeding and weight measures. This may indicate that more research is necessary to delineate the relationship between CC strategies and their effect on reducing BMI levels and risk for overweight, particularly across racial and ethnic groups.

3. **Moderating role of social and cultural factors on parental beliefs and behavior**

The environmental influences of child obesity are integrated within the mother's contextual factors. Namely, maternal beliefs and behavior may be moderated by maternal socioeconomic and sociocultural factors, which may directly interact with the mother's child-feeding strategies, or may empirically influence the child's beliefs and behaviors about eating, diet, and physical activity to feed into the aforementioned cyclical relationship. The proposed theoretical model contends that the effects of parental beliefs, intentions, and behavior on child overeating behavior will be moderated by sociocultural factors (e.g., cultural norms, coping strategies, acculturation, and social support). According to Holmbeck (1997), "a moderator interacts with a predictor variable in such a way as to have an impact on the level of a dependent variable" (p. 599). The theory of planned behavior can be used to expand on the concept of cultural norms, which is closely associated with the concept of subjective norms (Ajzen, 2002), whereby a person's beliefs in the behavior or actions valued by members of their cultural network motivates him or her to comply with these norms to gain the approval of their network. In other words, cultural norms are agreed-upon expectations within a culture that are used to guide behavior. Childhood overweight is influenced by cultural norms for eating experiences and perceptions of body image. Families are responsible for socializing children about food within in the context of culture.

Culture plays a significant role in the dietary choices that children make because it impacts their parents' perceptions about weight and health as well as the foods made available at different stages of life. Parental cultural values and beliefs about a "healthy" body image impact the verbal cues used during child feeding. While parents desire for their children to be healthy,

their perception of what a "healthy" weight is often differs from the professionally recommended standards (Savage, Fisher, & Birch, 2007). An ethnographic study exploring the impact of the sociocultural roots of childhood obesity on Latino child-feeding practices determined that Latinos employ coping strategies that are culturally driven by ideals of good parenting, well-being, and fuller body size (Kaufman & Karpati, 2007). For example, Latina mothers' attitudes and beliefs about a fuller body image may impact their children's development of dietary behavior, which may result in a higher prevalence of overweight. In a study by Contento and colleagues (2003), Latina women in New York City identified a personal preference for thinness, but a fuller figure image for their children, specifically for their daughters (Johnson & Birch, 1994).

Culture shapes food preferences, which influence the foods purchased and made available to children. However, research has indicated that acculturation measured by the number of years an immigrant has lived in the United States may influence beliefs about eating. A study of low-income Latino families residing in the United States revealed that although Latinos had a cultural preference for fruits and using these as rewards, fatty foods had become more prevalent in their diet. Consumption of foods high in fats, cholesterol, and carbohydrates, as well as larger portions may increase the child's susceptibility to overweight (Mennella et al., 2005).

Geographic culture also influences health. As immigrants attempt to assimilate to a new culture, they adopt behaviors that may be harmful to their health and incongruent with the norms of their former culture. For example, a study of Latinos in the United States (a U.S. native or resident for more than 15 years) revealed that highly acculturated Latinos were more likely to become overweight or obese, which is less prominent among recent immigrants or individuals in their native countries (Abraido-Lanza, Chao, & Florez, 2005).

A sense of community among Latina immigrants has been noted for increasing the effects of protective health (Bathum & Baumann, 2007). Building off of the social networks theory, the presence of social support or exchanged interpersonal interactions can enhance or diminish health outcomes. Among Latino families, Latina mothers are significantly influenced by their elders' beliefs within a cultural context, whereby grandmothers, for example, may reinforce the incorporation of solids foods and sweetened beverages to infants prior to the recommended six-month age (Mennella et al., 2005). A study by Reifsnider and colleagues (2006) found that low-income Latina mothers valued family, especially older women, as authority figures on infant and child-feeding practices when compared to trained health experts. Thus, the influence of culture and elders among Latinos may diminish maternal nutritional self-efficacy.

4. **Child health outcomes as reflected by child weight status**

The triadic influence of person, behavior, and environment on health outcomes is reflected in the proposed conceptual model. More specifically, the SCT constructs and other related theoretical concepts are used to describe the interaction between parental beliefs, intentions, and behaviors that influence child overeating, and consequently overweight or obesity. The proposed theoretical framework also borrows concepts from the life course health development theory to summarize the development of child-eating behaviors, overeating, and overweight (Halfon & Hochstein, 2002). The life course health development theory is an integrated framework that "explains how health trajectories develop over an individual's lifetime" (Halfon & Hochstein, 2002, 436). Early child experiences with food (e.g., maternal restrictive feeding practices and disinhibited modeling of food consumption) influence their eating behavior (e.g., excessive eating), which in turn impacts long-term outcomes (e.g., overweight or obesity and T2D) in adulthood during the middle and end of life. Life pathways

are nonlinear and nested. Thus, a child's health trajectory is cumulatively influenced by their experiences within the context of their historical, social, economic, and cultural environments. Research demonstrates that overweight and obese children are more likely to become obese adults and hence are susceptible to incurring a host of health and disease outcomes (Ogden et al., 2002).

Children have an innate ability to self-regulate their energy intake. According to Sherry and colleagues (2004), child-feeding practices can promote the child's internal feelings of satiety; however, mothers generally do not believe their children when they say they are satisfied or full. Consequently, mothers will encourage their children to eat more after the child ceases eating. Under the food reinforcement and behavioral choice theory, dopamine levels have been correlated with reinforcement of food stimulus response in children and subsequent eating choices (Epstein et al., 2007). Similarly, Davidson and researchers (2007) proposed that hippocampal functioning may be altered by repeated overeating. This implies that the neuronal messages that allow young children to determine feelings of satiation are replaced by messages of excessive eating behavior. In addition, James, Gold, and Liu (2004) proposed that overeating is an abnormal cognitive response and neuroendocrine reward process that results in a substance dependence disorder. Thus, these behavioral theories reflect that early child experiences with food can impact lifelong dietary behavior that can promote overeating and overweight through adulthood.

5. **<u>Summary</u>**

Studies using SCT models have demonstrated sustained behavioral changes for nutrition practices and physical activity resulting in sustained weight loss (Winnett et al., 2005).

However, there is limited research observing SCT constructs on Latino subgroups, specifically in relation to early childhood obesity development and/or prevention. In addition, research observing Latina maternal strategies to prompt eating is limited and the relationship between Latina child-feeding practices and child obesity is poorly understood, particularly among Latino subgroups like Puerto Ricans. As the population of Latinos continues to grow, it is necessary to develop ethnically appropriate dietary guidance, education, and interventions to reduce adverse health effects of overweight; however, research on the relationship of child-feeding practices among Latinos is limited as it is primarily based on Mexican American samples. Therefore, further research is warranted to understand the relationship between the proposed study variables and child weight status as these may impact Puerto Rican families. The model proposes that Puerto Rican maternal outcomes have a culturally rooted template of a healthy child, dietary practices, and weight that impact goals and intentions to engage in particular child-feeding practices that influence child behavior and weight status. For example, given Latina maternal preference for a pudgy child as an indicator of health, it is projected that Puerto Rican mothers will have a greater likelihood to encourage children to eat more, which may contribute to overeating and hence overweight. This is also indicative of Latina maternal concerns about their visibly overweight or obese child who *no come nada* (does not eat anything) (Garcia, 2004). Maternal beliefs and behavior are moderated by sociocultural factors that in turn influence child health outcomes throughout the life course.

B.   **Operational Definitions**

    1.   **Anthropometry**

Child and maternal weight status will be defined by anthropometry or anthropometric measures. Anthropometry is defined as a sensitive measure of nutritional status that encompasses the individual's nutritional environment, dietary intake, energy expenditures, and general health through various body measures (Ulijaszek, 1997). Therefore, anthropometry is used as an indicator of child nutritional status: undernutrition and overnutrition. Although measuring undernutrition has posed greater concern in the past, more recently the obesity epidemic has increased concern over correctly evaluating overnutrition. Thus, excess body fat or obesity is recognized as an indicator for overnutrition. Because excess adipose tissue has been found to contribute to comorbid conditions, anthropometric measures are often used as a screening mechanism to predict weight-related health risks. Although there are numerous measures of anthropometry, nutritional status (and hence weight status) is most commonly measured by weight, BMI, and WC (Ulijaszek, 1997).

    2.   **Child-feeding practices**

For the purpose of this study, child-feeding practices refers to the strategies employed by mothers around providing, managing, controlling, and modeling their children's dietary intake. Hughes and colleagues (2005) classified these into two categories: PC and CC strategies, which are rooted in parenting styles. Parent-centered strategies have been found to be centered on pressure and persuasive tactics to elicit the desired child response or behavior. Consequently, the employment of PC feeding practices increases the propensity for children to adopt behaviors promoted by external cues (e.g., to overeat when prompted by a parent), and

thus overriding their internal satiety cues. These feeding practices have been found to be counterproductive in managing child weight status. Therefore, PC strategies are referred to as health-compromising or negative child-feeding strategies. The PC approaches include control tactics, such as food restriction, pressure to eat, and negotiation and rewards to encourage eating. On the other hand, children's feelings of satiation, self-regulation of food intake, and healthy weight status can be promoted through CC strategies including encouragement of self-reliance, parental role modeling, and child involvement in meal planning and preparation. Thus, CC approaches are defined as health-promoting or positive child-feeding strategies.

3. **Early childhood development**

Childhood development is defined as a process of biological, motor, cognitive, and social maturation in which the individual incrementally acquires knowledge or skills through exposure of events and experiences. Based on Piaget's stages of cognitive development, it is during the preschool years that children begin to reflect on and recall experiences based on what they have seen, felt, heard, or tasted. The early childhood development period, or the preschool years, has been defined as between two and six years of age (Berk, 2008; Story, Holt, & Sofka, 2002). A habit is defined as a learned pattern of behavior that is acquired by "frequent repetition of an activity" (Ramos & Stein, 2000, S230). In terms of the development of dietary habits, a pattern of behavior is a learned process acquired through repeated exposures and experiences with stimuli related to food choices.

4. **Healthful diet**

The U.S. Department of Agriculture's (USDA) Food Guide Pyramid will be used as a guide in defining nutritional requirements for preschool children. According to the Food

Guide Pyramid, a "healthy" diet includes a variety of foods from the basic five food groups: whole grains, (fresh) fruits, vegetables, dairy, and proteins. The recommendations are the same for adults and children; however, the portions for children are reduced to two-thirds of the recommended adult servings. These foods are referred to as healthful because they are nutrient-rich foods. The USDA also recommends a reduction in the consumption of unhealthful food choices, such as energy-dense, nutrient-poor foods and beverages. Unhealthful foods include saturated fats, salty and sweet snacks, and sugar-sweetened beverages.

5. **<u>Acculturation</u>**

Acculturation is defined as a multidimensional, dynamic, and iterative process in which members of one cultural group adopt the beliefs and behaviors of another group. Acculturation occurs when an individual interacts with another culture's ideas and values. The process usually transpires over time. However, because culture is a dynamic and negotiated process, individuals do not acculturate along a continuum. Current models of acculturation describe four categories of the acculturation paradigm whereby a person may be bicultural, assimilated, unacculturated, or marginalized (Korzenny & Korzenny, 2005; Lara et al., 2005). Biculturality is indicative of individuals who have acculturated to the new cultural norms while preserving cultural values from their native culture. An individual may assimilate completely to the host culture. Unacculturated individuals exhibit a preference for maintaining their own cultural values while rejecting those of the host culture; and thus are also referred to as Latino-dominant. People who are marginalized are described as placing low value on cultural norms of either their native or host culture. Nonetheless, an immigrant's degree of acculturation may vary depending on the situation or context. Acculturation also is distinguished from culture and cultural identity. Culture is defined as a lived experience of people shaped by their location in the

class and socioeconomic stratification systems (Darder-Torres, 2000). Here, cultural identity will refer to Puerto Rican cultural identification in the context of a shared experience among individuals of Puerto Rican descent residing the greater HP Chicago community.

6. **Puerto Rican cultural identity**

The term Puerto Rican cultural identity refers to mothers who self-identify as Puerto Rican and who have at least one parent of Puerto Rican descent. Participant nativity in Puerto Rico is not a requisite for cultural identification. According to Ramos-Zayas (2003), the Puerto Rican identity in the Chicago HP community is marked by sociopolitical affiliations and consciousness within the historical context of the Puerto Rican independence movement as well as the spatial identity evident by the 72-block boundaries of the greater HP community. Such an identity is particularly conflated by an urban-poor identity and is in conflict with the Puerto Rican middle-class. Mainland Puerto Ricans refers to U.S.-born Puerto Ricans or Puerto Ricans living in the United States. Island-born Puerto Ricans describes individuals born in Puerto Rico who emigrated to the United States. Island Puerto Ricans is used to describe natives residing on the island of Puerto Rico.

C. **Review of Related Literature**

1. **Child anthropometric measures and obesity development**

a. **Anthropometric measures**

Anthropometry is a sensitive measure of nutritional status, but it reflects much more than the individuals' nutritional environment. Anthropometric measures have been in existence for more than 200 years and were historically intended for use in the recruitment of

military personnel as well as selecting slaves (Ulijaszek, 1997). In the past 50 years, undernutrition and its appropriate measurement have become of interest in developing countries; however, more recently there is an increasing attention for measuring overnutrition, particularly in children, as a result of the obesity epidemic.

Anthropometry is determined by raw measures as well as indices. Raw measures include weight, length, height, arm circumference, waist and hip circumferences, and skinfolds. Indices combine two or more raw anthropometric measures to provide more comprehensive assessments of overnutrition or undernutrition than a sole raw measure. Commonly used indices include BMI, arm muscle area, arm fat area, mid-arm circumference-to-height ratio, waist-hip ratio, and triceps-subscapular skinfold ratio. Height is a measure of skeletal or bone growth, while weight measures soft tissue and bones.

Growth and body size are directly influenced by three factors: dietary intake, energy expenditures, and general health (Ulijaszek, 1997). Abnormal growth patterns (e.g., decrease or increase) serve as an early response to nutritional inadequacy. In children, growth curves are used to monitor child growth and development, to assess nutritional status, and for population surveillance (Ulijazek, 1997). Originating from population-based school and community studies, growth curves provide a sex- and age-specific index of child development. It is important to note that there are different CDC Growth Charts for infants up to the age of two years and for children from ages two to nineteen. Infant growth charts generally use recumbent length while child growth charts typically employ standing height. Growth charts include sex-specific weight-for-length growth charts from birth to less than three years as well as weight-for-height for children two to five years of age. However, the fact that there are two measures that overlap for two year olds can create confusion and lead to inconsistencies in comparing data.

To ensure proper child growth and development, it is necessary to monitor overnutrition and undernutrition. According to Ulijazek (1997), the best indices for determining undernutrition in children are weight-for-height and height-for-age. Arm circumference has also been found to be an indicative measure in young children between the ages of one and five years. The medial calf measure has been reportedly useful for assessing child physical activity levels. However, BMI, a common measure for overnutrition, has been found to be a poor indicator of undernutrition. In screening for overnutrition, although weight unadjusted for height is useful if measured longitudinally, BMI has been the found to be the best indicator, particularly after transformation into Z-scores. Conversion into Z-scores is a common practice for avoiding issues with BMI percentiles scores with a limited upper range. The Z-score transformation can also be used for other measures such as triceps, subscapular skinfolds, or arm fat area. Among children, BMI correlates better with body fat across all ages, and has also been found to be a better index than weight-over-height, weight-over-height cubed, and weight-over-height to the power of π (Ulijazek, 1997).

A study conducted by Mei and colleagues (2002) observed various anthropometric measures (e.g., BMI, Rohrer index, and weight-for-height) to determine the validity of the CDC's age- and sex-specific BMI reference values for children. The researchers found that when percentage body fat (determined by average of the triceps and subscapular skinfold thickness) or total body fat mass was used, BMI-for-age (weight in kilograms divided by height in meters squared) was a significantly better measure of adiposity than Rohrer index-for-age (weight in kilograms divided by height in meters cubed) in identifying childhood overweight for ages three to nineteen. However, weight-for-height was still a good measure for detecting overweight as

there was no difference between this measure and BMI-for-age. Weight-for-height has been routinely used to screen for overweight and underweight in preschool age children.

Conversely, research indicates that WC may be a better predictor of overnutrition. For example, a study of Italian children age three to eleven demonstrated that WC was a stronger predictor for CVD risk indicators (e.g., blood-lipids and hypertension) than BMI (Maffeis et al., 2000). The risk profile for CVD in children was based on a WC above the 90th percentile. The investigators recommended using WC as a measure for children in clinical practice because of its utility and easily reproducible results. In another study comparing the utility of BMI, WC, and skinfolds for determining child risk for metabolic syndrome, Moreno and colleagues (2002) concluded that WC was the best screening measure of excess adiposity, which can increase risk of obesity-related morbidity even in normal weight individuals (Prentice & Jebb, 2001).

However, the proper means for measuring body fatness has been debated. For example, researchers assert that it is best to use direct measures, particularly for measuring excess accumulation of body fatness (obesity) (Prentice & Jebb, 2001). Nonetheless, evidence observing the validity of BMI and WC for measuring child overconsumption and disease risk has been inconclusive. Namely, a study by Prentice and Jebb (2001) claimed that BMI is a surrogate measure of body fatness. Furthermore, the investigators argue that of the three most common obesity measures, weight, BMI, and WC, none of these truly measure body fatness. They suggest that BMI is a commonly used and practical measure for surveillance and secular trends because it is a relatively inexpensive and simple index (Prentice & Jebb, 2001). Evidently, in order to further understand the utility of anthropometry for determining undernutrition and overnutrition, it is important to review the process of obesity development in children.

b.   **Early childhood obesity development**

The prevalence of childhood obesity has tripled since 1980 (Daniels et al., 2005); and overweight children are more likely to become overweight adults and develop long-term health problems (Ogden et al., 2002). A longitudinal sample of more than 1000 U.S. children determined that children who were overweight during the preschool (60%) and elementary years (80%) were more likely to be persistently overweight at middle school age and beyond in comparison to children who had never been overweight (Nader et al., 2006). Among Latinos, 12% of preschoolers from low-income households are overweight, a rate that surpasses all preschool age children from across the racial and ethnic groups in the United States (representing one out of every six children) (Flores et al., 2002). Thus, Latino overweight children may be disproportionately affected by unfavorable health outcomes throughout the life course. This projection is consistent with evidence that favorable birth outcomes among Latino infants dissipate by early childhood (Fuentes-Afflick, 2006). In particular, Puerto Rican children may incur greater risks given that they do not conform to the traditional birth outcomes of most Latino subgroups (Fuentes-Afflick, 2006; Mendoza, 1994).

Healthy child development has been defined as a lifelong adaptive process; however, early childhood is a critical period of development where children acquire bio-socio-behavioral attributes (Halfon & Holchstein, 2002). Physiological, psychological, and social needs of children interact throughout their development cycle. Physiological, psychological, and social development in the context of early childhood obesity are influenced by food intake, (i.e., nutritional status), heredity, and emotional well-being as well as environmental and cultural factors.

Physiological development is marked by a decrease in physical growth in early childhood from the infant to toddler years. Eating becomes unpredictable during the preschool years as children's appetites decrease, which parallels slower growth in comparison to infants (Berk, 2008). Thus, the amount of food children consume varies from meal to meal. This may cause concern for parents over the quantity or frequency in which their child eats. For example, Latina mothers may be particularly affected as reflected in the concern among mothers of overweight children that their children do not eat or are not eating enough (Garcia, 2004). In turn, this may increase the use of strategies to pressure their children to eat, which contributes to unhealthy eating behavior among children (Arredondo et al., 2006). The imbalance between excess energy intake and limited energy expenditure results in childhood overweight and can limit children's physiologic development. The self-regulation of food intake is an innate attribute that impacts hunger control, food consumption, and satiety as well as metabolic responses (Daniels et al., 2005). The emotional climate at home may also limit a child's innate ability to self-regulate energy intake (Berk, 2008). In addition, food preferences are shaped by a child's early experiences with foods, whereby children have a genetic affinity for sweet and salty foods, which are generally characteristic of less healthful choices (Savage, Fisher, & Birch, 2007).

Outcomes data from national health studies observing trends in weight widely reported the increased prevalence of childhood overweight recognizing higher rates for Latino children (Ogden et al., 2002). The physiological health consequences associated with overweight include hypertension, high blood cholesterol, and high blood glucose levels (Ogden et al., 2002), which are risk factors for CVD. In addition, Latino children have been found to have higher rates of insulin resistance, T2D mellitus, and metabolic syndrome as well as obesity-related liver disease (Ogden et al., 2002). However, some clinical data implicate a genetic predisposition for

metabolic complications and fatty liver among youth, but this needs to be studied further (Stovitz, et al., 2008).

During early childhood, children's psychological development is limited to distinguishing items (e.g., foods) that are most familiar to the child through repeated exposure. Thus, children more readily recognize rather than recall foods that they are exposed to in their food environments. Younger children have shorter attention spans and think more concretely (Berk, 2008); therefore, it is more difficult for children to engage in educational tasks that require recall and abstract thinking about the relevance of good nutrition for weight outcomes. However, psychological research on childhood obesity has been primarily limited to depression as a contributing factor to child obesity, although obesity itself may also contribute to depression in children (Daniels et al., 2005). Even though there are challenges to identifying depressive symptoms in preschool age children, observations of children at play and emerging interview techniques using hand puppets have revealed that children two to five years of age exhibit similar symptoms to older children and adults including stomachaches, anhedonia, sleep disturbances, restlessness, and irritability (Luby et al., 2003).

Overweight children also have compromised social relationships, such as stigmatization, which are associated with psychological distress and subsequent suicidal ideation and suicide attempts in older children (Daniels et al., 2005). However, these studies did not capture patterns in Latino youth or early childhood. A study by Musher-Eizenman and colleagues (2004) on preschool children's perception of body image found that the heaviest body diagrams of children were chosen less often as playmates, but did not influence their friendship selections; however, this study was conducted on a sample of White, middle-class children and did not observe the psychological impact of the children's playmate preferences. More research needs to be

conducted to understand the relationship between obesity and psychological factors among Latino children. The social development in early childhood is also influenced by the child's social environment and the foods available in their environment. For example, children want to model their parents and thus parents' food choices shape children's dietary preferences. In addition, feeding practices employed by parents to manage their children's eating can promote or inhibit healthy consumption patterns than can contribute to issues with weight status. Furthermore, children develop emotional competence and self-esteem during early childhood. Therefore, feelings of inadequacy can ensue when parental strategies focus on child weight as a problem or deficit as opposed to focusing on positive self-esteem building by developing competency and autonomy in selecting healthful foods and establishing lifelong healthy dietary habits.

c. **Childhood development of nutrition behavior**

The development of dietary behavior in early childhood is influenced by biophysiologic, behavioral, psychosocial, sociocultural, socioeconomic, and environmental factors. Biophysiologic factors include genetic composition, predisposition to biologic outcomes such as weight, and physiologic factors such as a child's affinity for foods with high content of carbohydrates, fat, sugar, and salt as well as learning from repeated exposure. Behavioral factors are defined as energy intake, physical activity, and sedentary behavior. Psychosocial factors include parental or caregiver modeling, parental strategies to encourage child feeding, food experiences from childbirth, child's reluctance to try new foods (Ramos & Stein, 2004), and attitudes and experiences related to eating behavior (Schacht et al., 2007). Sociocultural factors are determined by cultural dietary habits and perception of body image, while socioeconomic factors are influenced by the parent's experience with food scarcity, income, neighborhood

safety, and access to fruits and vegetables. Environmental factors include dietary influences in the home, child care, school and community.

In relation to dietary behavior, adequate childhood development can be assessed by the child's eating patterns in the presence or absence of hunger, emotional associations with food, concerns about eating, dietary restraint, fear of weight gain, parental pressure, and control over eating practices (Schacht et al., 2006), and child identification with parental personality traits and body image (Hahn-Smith & Smith, 2001). Thus, the experiences children have with food trigger behavioral responses that in turn shape their lifelong food preferences (Briley & Roberts-Gray, 1994; Chance, 1994) and impact overweight (Johnson & Birch, 1994).

A study by Mennella and colleagues (2005) found that children consumed more foods that were sweet or starchy. Children had an affinity for fruits over vegetables, although starchy vegetables, generally in a fried form (e.g., french fries) were also preferred. Among the most-consumed vegetables by children ages four to twenty-four months, none were leafy greens, which are more bitter-tasting and less palatable to children. Reifsnider and colleagues (2006) found that Latina mothers were more like to feed infants cereals and pureed food from birth even though it is not recommended by the American Academy of Pediatrics (AAP) to introduce these foods until four to six months of age. Latina mothers were also more likely to introduce solid foods earlier than the recommended age. In addition, lack of appropriate knowledge and financial resources were consistent with increased food purchases of unhealthful, inexpensive foods, such as ramen noodles, which were fed to three-year-old children for lunch on a daily basis (Reifsnider et al., 2006). Research demonstrates that these practices promote childhood overweight. The prevalence of obesity in children has increased awareness of the dietary practices and the need to reduce overconsumption, particularly excess energy intake of

unhealthful foods. Encouraging child autonomy over dietary intake can improve self-regulation and promote healthy weight status.

d. **<u>Child self-regulation of energy intake</u>**

Children have an innate ability to self-regulate their energy intake at birth. It is parental practices that teach the child to override their internal cues (Savage, Fisher, & Birch, 2007). According to Sherry and colleagues (2004), child-feeding practices can promote the child's internal feelings of satiety; however, mothers generally do not believe their children when they say they are satisfied or full. Consequently, most mothers will encourage their children to eat more after the child ceases eating (Sherry et al., 2004). Similarly, verbal cues and strategies employed by parents to encourage or coerce children to eat certain foods at specified times may impact their internal feelings about dietary self-regulation and increase the potential for weight gain (Faith et al., 2004).

In particular, restrictive and coercive verbal cues begin to reframe children's dietary behavior based on external environmental cues as opposed to their internal cues. Examples of maladaptive cues that undermine self-regulation of energy intake in children include providing large portions of food, particularly unhealthy, palatable food; pressuring the child to eat; restricting unhealthy snacks; and parental modeling of excessive consumption. Traditional parental feeding strategies promote increased dietary intake and consumption of unhealthy food choices regardless of the children's hunger sensation feelings. Instead of allowing children to self-regulate their eating based on their hunger or satiation cues, feeding practices are governed by parental fears that their child will be unhealthy if they do not eat at specified times or specified portions. These maternal practices "can be maladaptive in the current food environment

where food excess, obesity, and chronic disease have replaced food scarcity and infectious disease as major threats to children's health" (Savage, Fisher, & Birch, 2007, 31). This may influence whether a child becomes a selective eater or an overeater. Researchers have found that "picky eaters" are twice as likely to be underweight while overeaters are six times more likely to be overweight than normal eaters (Dubois et al., 2007). In addition, evidence demonstrates an association between parental restriction and childhood weight gain, particularly for girls (Schacnt et al., 2006). Mothers of overweight children may be more likely to practice restriction as a means of weight management. However, a child's resistance to coercive feeding strategies (e.g., restriction) may in turn motivate the parent/s to continue to exert manipulative PC approaches. For example, when a parent, who out of concern for his or her child's health and well-being, is unsuccessful in getting a child to refrain from consuming restricted foods, this may perpetuate a vicious cycle as the parent is determined to get the child to comply with the desired behavior. Thus, child-feeding practices may lead to a bi-directional relationship between the parent and the child, which may contribute to overeating behavior and overweight.

2.   **Parent-child bidirectional relationship and parenting styles**

Parents and children have a bidirectional influence on each other. Thus, parenting styles impact child behavior and child behavior cyclically influences or reinforces parental behavior. In a landmark series of studies on parenting by Baumrind (1966), three characteristics emerged that distinguish effective and less effective child rearing styles: acceptance and involvement, control, and autonomy granting. There are four childrearing or parenting styles: authoritative, authoritarian, permissive, and uninvolved (Baumrind, 1966, 1967; Maccoby & Martin, 1983). Authoritative parenting is comparable to CC, health-promoting child-feeding practices. Conversely, PC, health-compromising strategies are reflected by authoritarian,

permissive, or uninvolved parenting styles. The relationship between parenting and children's attributes becomes bidirectional over time.

Authoritative parenting is considered the most effective parenting style and involves high acceptance and involvement, adaptive control techniques, and appropriate autonomy granting. Authoritative parents are warm, attentive, and sensitive to their child's needs. This style of parenting has been associated with many aspects of competence including better achievement, self-confidence, positive attitude, maturity and self-control. Authoritative parenting, a powerful source of resilience, has been found to serve as a protective mechanism against family stress and poverty (Berk, 2008) as well as improving child social and academic competence (Rogoff, 2003). The children of parents who were more indulgent or permissive were twice as likely to be overweight than children of parents described as authoritative (Hughes et al., 2007). Although indulgent parents have been found to perceive benefits of increased fruit and vegetable availability for their children at home (Hughes et al., 2007), researchers have found this practice to be more indicative of authoritative parenting style (Savage, Fisher, & Birch, 2007).

Authoritarian parenting is marked by low acceptance and involvement, high coercive control, and low autonomy granting. Authoritarian parents appear cold and rejecting; they frequently degrade their child by putting her down. To exert control, they yell, command, and criticize. "Do it because I said so!" is their attitude. They make decisions for their child. If the child resists, they resort to force and punishment. Children often become anxious, unhappy, and low in self-esteem and self-reliance. This indicates that authoritarian parents may be more likely to employ practices that are coercive, such as restriction and pressure to eat. Thus, the child may respond with resistance to these demands.

Permissive parents are warm and accepting, but uninvolved. They are either overindulgent or inattentive making little effort to control their child's behavior. They allow autonomy over decision-making at inappropriate developmental stages. Children tend to be impulsive, disobedient, and rebellious. The children are also overly demanding and more dependent on parents. With regard to child-feeding strategies, permissive parenting literature implies that parents will be more likely to concede to children's demands for unhealthful food choices to promote eating, even though these may be harmful (Sherry et al., 2004). Permissive parents may also be less likely to monitor portion control of food consumption, which may contribute to child overeating and overweight.

Parents who are uninvolved or neglectful exert low acceptance and low involvement with little control and general indifference over autonomous decision-making. Parents are generally emotionally detached and depressed. Children of uninvolved parents tend to display poor emotional self-regulation, low school achievement, and antisocial behavior (Maccoby & Martin, 1983), which suggests that they may be more susceptible to overeating or other eating disorders. Research demonstrates that parenting styles vary cross-culturally. However, there is limited evidence that observes the influence of Latina mothers' parenting styles on children's patterns of dietary intake. Nonetheless, the maternal influence on child-eating behavior has been well noted.

3. **<u>Maternal influence on eating behavior</u>**

Food preferences have been traced to begin during pregnancy when the fetus is able to sample maternal choices of energy intake (Savage, Fisher, & Birch, 2007), but others claim mothers begin shaping their children's nutritional palate through flavor experiences from the mothers' diet in breast milk (Mennella et al., 2005). However, early childhood experiences

with food develop a foundation for long-term lifestyle dietary behaviors (Briley & Roberts-Gray, 1994; Chance, 1994) and impact overweight (Johnson & Birch, 1994). In particular, it is during the preschool years (between age two and six), when children begin to self-feed and make food choices, that their development of dietary behavior begins to take form. However, children's food preferences and hence, choices, are limited to the foods made available to them by their parents.

Maternal influence is of significance because mothers generally manage the household and are typically self-reported as being the most knowledgeable about the child's health and behavior (Dubois et al., 2007). Parental behavior also influences children's development of eating habits (Ramos & Stein, 2000; Sherry et al, 2004). For example, the ability of adults to role model self-regulation over "unhealthful" food choices has a positive impact on child self-control or healthful energy intake and decreased body fat (Savage, Fisher, & Birch, 2007). Maternal socioeconomic, psychosocial, and sociocultural factors may place children at risk for becoming overweight and obese during the early years. For example, Latino families from low-income backgrounds have been found to elevate the risk of obesity (Flores et al., 2002). Neighborhood factors such as limited access to fresh produce may influence this risk among low-income families. Similarly, maternal child-feeding strategies to restrict or encourage eating may increase the potential for weight gain (Faith et al., 2004). In addition, role modeling of healthy practices may promote normal weight (Savage, Fisher, & Birch, 2007). In particular, parent practices for child feeding have been linked to be among the most significant contributors to child overweight as it pertains to early childhood development.

a.   **Maternal child-feeding practices and child anthropometry**

As previously noted, Hughes and colleagues (2005) have defined maternal child-feeding strategies as being PC or CC approaches. Parent-centered tactics have been identified as being coercive, manipulative, and counterproductive because these typically replace a child's natural internal satiety cues with external cues, which increase obesity risk. In other words, a child who is restricted from eating unhealthy snack foods has a greater likelihood of becoming fixated on the external stimuli of seeking and eating these forbidden foods; and, consequently, restriction increases childhood obesity risk because of children's overconsumption of the restricted foods (Faith et al., 2003). Researchers found that food restriction predicted obesity risk as measured by greater weight gain and higher BMI rates (Faith et al., 2003) even among preschool age children (Faith et al., 2004). Conversely, some PC strategies like pressure to eat may be resisted and result in decreased child weight.

Pressure to eat is another PC strategy found to affect child weight status. Research observing the influence of pressure on food intake and weight determined that children who were pressured to eat were less likely to comply and thus more likely to have a decreased BMI (Galloway et al, 2003). A study based on the CFQ supported the relationship between pressure to eat and lower BMI rates among children (Faith et al., 2004). Consequently, there is an inverse relationship between pressure to eat and food intake (Galloway et al., 2006) as well as BMI (Faith et al., 2004; Galloway et al., 2006).

In addition, mothers may employ negotiation strategies to encourage their children to eat. For example, a study by Sherry and colleagues (2004) identified different dietary tactics employed by mothers cross-culturally to encourage eating. Researchers found that all parents

used negotiation, such as accommodating meals to promote eating (Sherry et al., 2004). Parents were also likely to positively reinforce the consumption of sweets by using these as bribes, rewards, and pacifiers. In addition, Orrell-Valente and colleagues (2007) found that using reasoning, praise, and reward was more likely to manifest in a food intake response. However, this behavior was more common among middle-class White mothers. Regardless of whether the intention is to encourage or coerce children to eat certain foods at specified times, verbal cues utilized by parents may impact their children's internal feelings about dietary self-regulation and increase the potential for weight gain (Faith et al., 2004).

On the other hand, CC strategies (e.g., self-reliance and modeling) can support children's feelings of satiation. Child-centered child-feeding practices encourage child self-regulation of food intake, which has been found to reduce dietary fat intake (Bourcier et al., 2003) and lower BMI scores (Faith et. al, 2004). However, evidence has not been consistent with determining whether parental encouragement of child self-regulation or self-reliance of food choices is beneficial. A study by Faith and colleagues (2003) indicated that mothers who allow little-to-no child self-regulation may also have children with lower BMI. Similarly, research aimed at observing the impact of maternal control strategies on BMI was not significant (Johannsen, Johannsen, & Specker, 2006). This may indicate that more research may be necessary to delineate the relationship between CC strategies and their effect on reducing BMI levels and the risk for overweight.

The dietary choices available to children are also influenced by the parents' modeling of healthy behavior. Preschoolers also begin to mimic their parents' behaviors (Berk, 2008). Thus, parental behavior influences childhood development of eating habits (Sherry et.al, 2004) through role modeling healthy protective lifestyle behaviors. The ability of adults to role model self-

regulation over "unhealthful" food choices has a positive impact on children's self-control for healthful energy intake and decreased body fat (Savage, Fisher, & Birch, 2007). In addition, when the parents model eating of fruits and vegetables, children also benefit as they are more likely to consume these (Reifsnider, Keller, & Gallagher, 2006).

In addition, sex differences in child-feeding practices also impact overweight. Johnson and Birch (1994) found that mothers exercise more control over girls than boys due to social pressure for women to be thin. Consequently, girls have difficultly learning how to regulate their own dietary intake. A study by Hahn-Smith and Smith (2001) observed the impact of daughters' identification with their mothers on their body image, eating attitudes, and self-esteem. The researchers found that girls who identified with their mother's personality traits were more likely to feel better about themselves and their body image while girls who had low identification with their mothers were more like to have problems with eating and poorer body image. In addition, parents communicate different messages at mealtime based on their child's sex. Namely, mothers are more prone to speak to their daughters about restricting portion size and losing weight, while encouraging their sons to eat more to increase muscle mass and strength (McCabe et al., 2007).

Regardless of the variation of feeding strategies used by mothers, they were all generally concerned about their children consuming a healthful diet. In addition, most mothers wanted to avoid child energy intake of sweet and processed foods (Sherry et al., 2004). However, much of this research has been conducted on samples of Euro-American women. Therefore, the cultural appropriateness of applying the feeding paradigm to Latino families has been criticized because it was developed for White, middle-class families (Hughes et al., 2006). In order to understand the impact of maternal behavior on Latino children, it is necessary to uncover the influence of cultural variations in parenting and child feeding on child overweight. The confluence of culture,

parenting styles, and feeding practices on Latino children and their health behavior and outcomes are also worth noting.

b. **Latina maternal cultural influence on parenting and child-feeding practices**

Latinos comprise the largest minority population in the United States, but research conducted on the development of preschool children's dietary habits in the Latino community is limited. Latino cultural influences on parenting styles and practices for child feeding have a significant impact on child health and obesity. Authoritative parenting has been attributed to promoting child autonomy and hence is beneficial in allowing the child to learn to better self-regulate their food intake. However, Latina mothers have been found to more readily exert control to manipulate child-eating responses, which may result in overeating and overweight (Hughes et al., 2005). Thus, Latino parents tend to be more authoritarian and more permissive than Whites (Berk, 2008). In particular, evidence also indicates that Latinas are more likely to employ controlling strategies attributed with authoritarian parenting, such as restriction (Faith et al., 2003) and pressure to eat (Hughes et al., 2005), and which as previously noted has been attributed to unhealthy eating habits among children (Arredondo et al., 2006).

Restrictive eating practices have been attributed to inhibiting the child's innate hunger and satiety cues, increasing the desire for the restricted foods and increasing the likelihood for overweight (Savage, Fisher, & Birch, 2006). Faith and colleagues (2003) found that like African American mothers, Latinas exerted more controlling tactics around restriction of child eating than their White counterparts. However, cross-cultural research by Hughes and colleagues (2005) found that Latinos used more controlling strategies to pressure their child to eat when

compared to African Americans. These strategies included demands, threats, and rewards and were known to increase the child's external orientation to food intake. However, the motivation behind high control strategies used by Latinas to encourage or increase intake of food appears to wane once the child becomes overweight or obese. This may be indicative of evidence that Latina mothers of overweight children were more likely to perceive their child as being normal weight (Reifsnider et al., 2006).

Conversely, Latinas may utilize strategies that promote healthy dietary behaviors. For example, a study found that low-income Latina mothers were more likely to use fruits as a "special treat," while low-income African American and Euro-American mothers were more likely to withhold drinks at meal time until a desired amount of food had been eaten (Sherry et al., 2004). Research also indicates that Latinas practice more CC strategies than African Americans mothers, which promote internalization with food consumption framed by the child's satiety cues (Hughes et al., 2006). In this study, CC techniques were defined as reasoning, complimenting, and assisting child with feeding. This supports research that indicates that Latinas balance parental authority with high parental warmth. Namely, Latinos' firm insistence on respect for parental authority when paired with high parental warmth has been found to have protective benefits in reducing child and adolescent conduct problems by promoting competence and strong feelings for family loyalty (Berk, 2008). For example, a study of Mexican Americans found that mothers living in poverty tended to adhere strongly to cultural traditions by combining warmth with strict, even somewhat harsh control that served as a protective function in that it was associated with reduced child and adolescent behavior problems (Berk, 2008). This may be of particular relevance among Puerto Ricans who hold a high regard for parental authority and respect is highly valued from children (Comas-Diaz & Duncan, 1985). As previously noted,

authoritarian parenting may contribute to loss of autonomy over self-regulation and consequently overweight.

c. **Latina cultural variations in child eating and overweight**

Childhood overweight is also influenced by cultural practices, eating experiences, and perceptions of body image. Families are responsible for socializing children about food within the context of culture. In the Latino culture, mothers are more likely to use fruits as special treats or dessert (Sherry et.al, 2004); however, consumption of foods high in fats, cholesterol, and carbohydrates, as well as larger portions, may increase the child's susceptibility to overweight (Mennella et al., 2005). Among low-income Latino families, fatty foods were more prevalent (Ayala et al., 2005). In addition, Latino consumer trends indicate that an incremental decline in the purchases of fruits and vegetables (Valdez & de Posada, 2006), which may parallel the increased frequenting of fast food restaurants (Ayala et al., 2005; Valdez & de Posada, 2006) in neighborhoods where the availability of fruits and vegetables is less prevalent. When children are satiated with fruits and vegetables, which are fat free, this can stave off the consumption of high-fat foods (Reifsnider, Keller & Gallagher, 2006).

A cross-sectional study observing the relationship between maternal concerns about child overweight, feeding practices, and child overweight status in an ethnically diverse sample found that Latino parents (53%) are more likely to be concerned about their preschool children becoming overweight in comparison to their White (29%) and African American (49%) counterparts (May et al., 2007). Concerned mothers were more likely to use restriction than pressure to eat as a feeding strategy; however, neither of the strategies was a predictor of child

overweight. It is important to recognize that Latina decision-making with regard to parenting and child feeding may often be influenced or affected by others in their social networks.

<div align="center">
d.   **<u>Maternal social support with child feeding</u>**
</div>

Mothers' child feeding is influenced by individuals in their social networks and the support that they provide. Mothers report that control over their children's dietary intake is challenged by other family members including grandparents, the child's father, or another adult figure (Jain et al., 2001). In particular, mothers find it difficult to reinforce healthful habits when these are countered by other family members. Among Latino families, Latina mothers are significantly influenced by their elders' beliefs within a cultural context.

There are intergenerational influences that override the mother's intention to employ protective feeding strategies. A study by Reifsnider and colleagues (2006) found that low-income Latina mothers valued family, especially older women, as authority figures on infant and child-feeding practices when compared to trained health experts. In particular, Latina maternal grandmothers play a significant role in the child-feeding decision (Sanjur, 1995). Thus, the influence of culture and elders may diminish nutritional self-efficacy.

In addition, Bauthum and Baumann (2007) interviewed ten Latina immigrants to understand how they perceive and express a sense of community in adapting to American culture. Although the women in the study did not discuss the influence of American culture on health behaviors, they identified the influence of family members, especially husbands and children. Maintaining Latino cultural values and practices is believed to result in upstream, protective health factors (i.e., community-driven, community-based, patient-centered, and culturally sensitive as opposed to downstream, top-down health care-centered approaches).

According to Swinburn and colleagues (2004), a supportive home environment seems to have a protective effect against obesity. Nonetheless, there is little evidence to support the relationship between child social support with regard to feeding practices and child weight status, particularly among Latino subgroups. According to Anderson and colleagues (2004), women who are heads of the household may not have enough support with child feeding. Social support has been reflected as a key determinant of the choice to breastfeed infants in Puerto Ricans living in the eastern states of the United States (Anderson et al., 2004). Nonetheless, culturally rooted maternal perceptions about weight, diet, and health can also play a key role in maternal health behavior and feeding practices.

e.   **Latina maternal perceptions and beliefs about weight, diet, and health**

There are psychosocial, sociocultural, and socioeconomic factors that influence how mothers perceive their children's eating and health. Culture plays a significant role in the dietary choices that children make because it impacts the parents' perceptions about weight and health as well as the foods made available at different stages of life. Parental cultural values and beliefs about a "healthy" body image impacts the verbal cues that they use during child feeding. While parents desire for their children to be healthy, their perceptions of what a healthy weight is differs from the professional recommended standards (Savage, Fisher, & Birch, 2007).

Cultural beliefs among Latino and African American families that favor fuller body images are consistent with mothers' tendency to identify obese children as overweight (Sherry et al., 2004; Contento, Basch & Zybert, 2003). In addition, Latina mothers found images of a normal weight child to be "too thin" and potentially unhealthy. Similarly, research by Bruss,

Morris, and Dannison (2003) revealed that mothers associated thinner bodies with illness. Parental concern about the potential of child illness due to thinness influences the dietary intake that mothers provide their children (Bourcier et al., 2003). Thus, Latina mothers' attitudes and beliefs about a fuller body image may also impact their children's development of dietary behavior, which may result in a higher prevalence of overweight (Sherry et al., 2004; Contento, Basch & Zybert, 2003).

One of the factors contributing to mothers' inability to identify overweight children as overweight is their perceived locus of control for overweight and related health consequences. Mothers believe that overweight is a genetic, physical attribute; and, thus they have little control over changing their child's weight and identify childhood overweight as a stage that children outgrow (Seibold, Knalf, & Grey, 2003). In addition, Latina maternal beliefs of health locus of control in relation to healthy eating strategies have been found to be a better predictor than maternal education and acculturation in low-income, Mexican American mothers of young children (Seibold, Knalf, & Grey, 2003). Locus of control has also been found to mediate the relationship between maternal income and nutrition (Sanjur, 1995). Mothers also believe that weight and health are poorly correlated (Crawford et al., 2003) unless it prevents their children from being happy or from being physically active and interacting with peers (Reifsnider et al., 2006). Maternal perceptions of healthy child body size are also influenced by their association of food with love. A study by Bruss, Morris, and Dannison (2003) found that mothers associated a large BMI as being indicative of well-fed and well-loved children. Conversely, maternal weight and health history can also impact maternal perceptions about healthy child weight.

Overweight mothers have reported greater concern over their child's future health status (Johannsen, Johannsen, & Specker, 2006; Faith et al., 2004). In a study by Contento and

colleagues (2003), Latina women in New York City identified a personal preference for thinness, but a fuller figure image for their children, but specifically for their daughters (Johnson & Birch, 1994). Similarly, concern about child overweight was expressed by mothers from families with histories of obesity and diabetes where the mothers feared their children would develop diabetes as adults (Reifsnider et al., 2006); however, prior history of weight related illnesses was not associated with the parent's intention to regulate their child's dietary consumption or to promote other health-promoting behavior (Eickstein et al., 2006). Parents concerned about illness were more likely to promote lower fat consumption, while those preoccupied with thinness and looking good encouraged child intake of fruits and vegetables more frequently (Bourcier et al., 2003). However, maternal concerns about child health and weight may be mediated by income and nutrition (Sanjur, 1995).

f. **Latina maternal characteristics, child-feeding practices, dietary behavior, and weight**

Research indicates that maternal sociodemographic characteristics influence child-feeding practices and dietary behavior. Household and familial factors in the Latino family may also contribute to childhood overweight. Among Latinos, parent education, English-literacy, income, behavior (e.g., physical activity, food choices, child-feeding practices, and parenting styles), time, and costs influence physical activity and dietary practices of children that contribute to overweight. Demographic characteristics commonly reported to impact child nutrition and eating include maternal occupation, education, and income as well as marital status and age.

Latinos hold a strong presence in the workforce; however, most work is in low-wage service industry jobs, and thus, they have the lowest insured rates in comparison to other racial and ethnic groups. Unemployment among Latinos is generally 40 to 60% higher than among White, non-Hispanics and somewhat lower overall than African Americans (Vega & Amaro, 1994). In particular, Puerto Ricans have among the highest unemployment rates. Latino employment is concentrated in lower status occupations such as service workers or laborers, and is least likely to be found among professionals and managers. Latinas are nearly twice as likely to be employed in service, production, or laborer occupations as their Caucasian female counterparts (Vega & Amaro, 1994). Nonetheless, maternal employment rates have doubled since 1970 for mothers with children under six years old (Salsberry & Reagan, 2005). A study examining the impact of maternal employment on child obesity found a small association between child overweight and the total number of weekly hours worked (Anderson, Butcher, & Levine, 2003). In addition, preparing meals at home may be considered too time-consuming, particularly for working mothers and mothers with preschool children (Jabs et al., 2007).

Reportedly, Latinos have the lowest educational rates of any racial or ethnic group, which considerably impacts their entry in the labor market limiting opportunities to low-wage, low-skill jobs (Darder, Torres, & Gutierrez, 1997), particularly among Latino immigrants who may be less likely to be literate in English (Mendoza & Fuentes-Afflick, 1999). Nearly 50% of childbearing Latinas in the United States have less than a high school education (Fuentes-Afflick, 2006) making them the least likely racial or ethnic group to complete high school or college (Hayes-Bautista, 2002). Undereducation in the Latino community also impacts unemployment rates exceeding rates of their Euro-American counterparts next to African Americans. Lower education and labor attainment are also marked by high poverty rates, which in turn influence an

array of social issues and poorer health outcomes. High rates of undereducation also increase difficulty in communicating with health care providers. Latino families receive less preventive care and have less access to health education and health care services. In addition, lower educational attainment of Latino parents may also impact knowledge of foods choices or understanding of national dietary recommendations (Mendoza & Fuentes-Afflick, 1999). Consequently, Latinos are vulnerable to developing diseases and have high morbidity rates for obesity-related illnesses, such as diabetes, asthma, and certain cancers (Valdez & de Posada, 2006). According to Zambrana and Logie (2000), parental factors, particularly education and literacy levels, influence children's health access and outcomes. For example, maternal education has been associated with childhood obesity among mothers with low education; however, children with highly educated mothers were also more likely to be at risk for overweight (Fuentes-Afflick, 2006). Noted among the most salient indicators of child nutritional status, there is a direct relationship between greater levels of maternal education and better dietary intake (Sanjur, 1995).

Lower rates of educational attainment and underemployment impact income levels among Latinos. Research using the 1990 census data indicates that Puerto Ricans, despite their citizenship status, are more likely to live below poverty than any other Latino subgroup (Mendoza, 1994; Vega & Amaro, 1994). According to 2002 report on poverty status from the U.S. Bureau of the Census, Puerto Rican children are more likely to live below poverty, making them the most impoverished racial or ethnic group in the United States. To further illustrate the relationship between education, income, and health outcomes, a study on the impact of parental education and income on children's health found that Latino children are significantly more likely to have suboptimal health and infrequent care than White non-Hispanic children (Flores et

al., 1999). In particular, a literature review of Latino health status by Flores and Vega (1998) found that Latino children more prevalently encountered 22 barriers to health care access including household poverty and low parental education. It is purported that racial and ethnic minority groups are erroneously stereotyped as being the "causal" factor leading to certain health issues or behaviors when in fact other socioeconomic factors may be overlooked and more relevant (T. Mason, personal communication, February 22, 2006). Namely, poverty is identified as a contributing factor to obesity that negatively impacts the health status of all people (Mason, 2006).

As previously stated, parental income influences the accessibility and affordability of recreational activities as well as foods consumed. For example, low-income families reduce vegetable consumption because they perceive these to be too expensive (Gable & Lutz, 2000). In addition, socioeconomic status (SES) also influences health (Estroff & Henderson, 2005) and dietary behavior (Savage, Fisher, & Birch, 2007). For example, parents from low-income families have a tendency to overcompensate a history of food scarcity by overeating and overfeeding and thus increasing the likelihood that their children will be overweight (Savage, Fisher, & Birch, 2007). Furthermore, children and adults have a tendency to overcompensate food intake after a scarcity of food in order to prepare for the next potential shortage (Rose & Bodor, 2006). However, there is contradictory evidence on whether food insecurity contributes to childhood obesity. Some research suggests that there is no association between household food insecurity and child overweight (Whitaker & Orzol, 2006; Gundersen et al., 2008); conversely, other evidence implicates that experiences with lack of food security can contribute to overweight in children (Rose & Bodor, 2006).

Among low-income families with overweight children, one-third of the mothers do not perceive their child to be overweight. In fact, up to 80% of low-income mothers believe their overweight child to be of normal weight or even underweight (Savage, Fisher, & Birch, 2007). A study by Sherry and colleagues (2004) found low-income African American mothers and middle-income White mothers selected photographs of the heaviest (i.e., obese) children to identify overweight, while low-income White and Latina mothers identified overweight children as healthy and normal. In addition, low-income families are more likely to be overweight or obese (Gable & Lutz, 2000).Thus, socioeconomic factors shape maternal beliefs about child overweight. Nonetheless, a cross-cultural study indicated that a greater prevalence of obesity persisted after adjusting for maternal education, household income, and food security (Whitaker & Orzol, 2006). In other words, a greater prevalence for obesity persisted after controlling for these household characteristics.

It is also important to note that low-income neighborhoods typically have limited access to healthy dietary choices. For example, supermarkets are three times less likely to be available in poorer communities in comparison to affluent ones (Ayala et al., 2005). In fact, low-income neighborhoods are more likely to have convenience stores than supermarkets or grocery stores; and when these are available, they are less likely to carry low-fat food products and fresh fruits and vegetables than those in more affluent neighborhoods, which are likely to offer twice the amount of heart-healthy foods. In addition, regions predominantly populated by racial and ethnic minority groups are more likely to be poorer in contrast to affluent environments, which are four times more likely to be predominately populated by peoples of Euro-American descent (Ayala et al., 2005).

Marital status and age may also influence maternal practices. Latinas are more likely than their Euro-American counterparts to live in female-headed households (Darder, Torres, & Gutierrez, 1997). In particular, nearly 40% of Puerto Rican women are head of the household in comparison to Latinos of Mexican and Cuban-origin (Vega & Amaro, 1994). Female-headed households are more likely to live below the poverty level (Sanjur, 1995). Puerto Rican female-headed household have the highest rate of poverty among Latinos (Mendoza, 1994). However, with regard to mothers' health behavior and marital status, researchers determined that the prevalence of child overweight in five-to-six-year-old Latinos was comparable across marital status, education, and income (Ariza et al., 2004).

Children in single-headed households generally have younger mothers (Manning & Lichter, 1996). According to Ortiz (1995), Puerto Rican women have faced the most significant changes in marital and family status since the 1960s. Puerto Rican mothers are more likely to be single, to be head of the household, and to have children at younger ages (Ortiz, 1995). These characteristics translate to poorer SES and health behaviors. For example, in a study of acculturation and breastfeeding among Puerto Rican mothers, being a younger mother under 30 years of age was inversely associated with ever breastfeeding (Anderson et al., 2004). In addition, research on acculturation, SES, obesity, and lifestyle factors of Puerto Rican mothers found that younger mothers were more likely to consume discretionary foods (e.g., high-sodium, -sugar, -fat snacks, or desserts, and artificially flavored and sugary drinks), which may influence childhood dietary intake and obesity. However, this study found that education and age did not explain the variance in food intake. In addition, a study by Abraido-Lanza and colleagues (2005) found that age and income were not associated with health behaviors. Similarly, a study observing maternal perceptions of preschool children's overweight found that maternal age and

educational level did not predict Latina mothers' perception of child overweight (Hackie &

Bowles, 2007).

Given the mixed findings between maternal sociodemographic characteristics and

childhood obesity, this relationship needs to be studied further, particularly as these relate to

Puerto Ricans in the United States. Evidence indicates that maternal sociocultural factors, such

as acculturation, may have a greater impact on child dietary intake and weight status. Therefore,

in discussing Latino culture in the United States, it is also important to understand the impact of

acculturation on maternal health behavior and outcomes.

4.   **Maternal acculturation, dietary behavior, child-feeding practices, and obesity**

Acculturation has been found to impact food choices in three ways: (1) addition

of new foods, (2) substitution of foods, and (3) the rejection of foods (Story et al., 2002). First,

new foods from the American culture (e.g., fast foods) may be incorporated into the "Latino

diet." In addition, immigrants may renegotiate their native diet by replacing foods that are more

accessible and/or convenient. For example, traditional foods not readily available in the host

country may be substituted with other obtainable foods from the "American diet." However,

individuals may also reject the foods of the host culture. In other words, after exposure to new

foods, immigrants may weigh the differences between the two cultures and feel that changing

their traditional diet would be a betrayal of their heritage (Winebrenner, 2005).

Acculturation status has been attributed to differences in nutrition and dietary patterns. In

a literature review of studies that assess the impact of acculturation on Latino health outcomes,

Lara and colleagues (2005) found that Latinos who were less acculturated were more likely to

have healthier diets. For example, lower levels of acculturation were associated with diets low in fat and rich in fiber, protein, vitamins A, C, E, B6, K, and folate, and calcium and magnesium among Mexican American women. Less acculturated Latinos were also more likely to consume more servings of fruits and vegetables than their Euro-American counterparts. On the other hand, Latinos with high levels of acculturation had decreased intake of fruits and vegetables (Lara et al., 2005) and increased dietary fat intake (Siatkowski, 2007). This suggests that as Latinos acculturate they assimilate to American dietary norms that include lower portions of fruits and vegetables.

It is important to note that the food environment and exposure to new cultural norms are also influential. It has been noted that with increased acculturation, Latinos are more likely to abandon their Latino diet, which in turn impacts increase in weight. The traditional Latino diet has been described as including an abundance of fruits, vegetables, beans, and whole grains. As Latinos acculturate, they adopt the American diet of large portions of low-cost, energy-dense foods (e.g., refined grains, added fats, sugars, and meats) referred to as dietary acculturation (Seth et al., 2007). Thus, acculturation has been implicated as a predictor of the shift in Latino food purchases.

Although research on Latino food choices and purchases is limited, studies suggest that higher acculturation is associated with Latinas' preferences for dining out for lunch and dinner as well as dining at fast food restaurants (Ayala et al., 2005). In a study by Ayala and colleagues (2005) observing the determinants of restaurant and food shopping selection of Latina women in southern California, Latina mothers' preference for fast food restaurants was influenced by their perception that these establishments provided better choices for their children. However, frequenting fast food restaurants can have negative health outcomes. For example, a study by

Duerksen and colleagues (2007) found that frequenting fast food restaurants may increase the risk for overweight among Latino parents and children, although risk for overweight was not apparent among Mexicans dining at Mexican restaurants. Nonetheless, Latinas were also more likely to shop for food at discount, bulk-discount stores, which are considered to be more affordable and more accommodating to Latinos (i.e., availability of ethnic food products). However, more acculturated Latinas were likely to shop at supermarkets or produce markets. Maternal food choices and culture are also influenced by feeding practices.

Understanding the impact of acculturation on Latino dietary health behavior is salient because nearly two-thirds of Latinas living in the United States are foreign-born (Fuentes-Afflick, 2006). However, most studies aggregate Latino subgroups as well as acculturative factors making it difficult to identify the unique differences that may influence diet, health, and behavior. As U.S. citizens, Puerto Ricans are considered to be the most transnational Latinos (Suarez-Orozco & Paez, 2002) and this impacts their acculturative process differently than other Latinos. For example, researchers have found variations in child-feeding parenting styles by generation or acculturation for Mexicans and Puerto Ricans. Namely, Mexicans in the United States are more likely to employ PC strategies—in particular, authoritarian parenting—than Mexican parents in Mexico (Arrendondo et al., 2006). On the other hand, New York Puerto Rican mothers of preschoolers are more likely to practice controlling behaviors than island Puerto Ricans; however, with increased levels of acculturation Puerto Rican parents are more likely to employ CC strategies like role modeling (Planos, Zayas & Busch-Rossnagel, 1995). Island Puerto Rican mothers may encounter barriers with regard to child feeding that are adopted generationally as cultural norms by U.S. Puerto Ricans. For example, Anderson and colleagues (2004) studied the influence of acculturation on breastfeeding among Puerto Rican women in

Connecticut. The researchers found that acculturation to American culture did not impact Puerto Rican mothers' breastfeeding behavior. Similarly, a study of Puerto Rican and Mexican mothers in Chicago revealed that Puerto Rican mothers do not meet any of the Healthy People 2020 goals for breastfeeding (Estarziau et al., 2006). The sociopolitical context of the criminalization of breastfeeding in Puerto Rico is thought to account for the low rates of breastfeeding Puerto Rican mothers (Anderson et al., 2004). However, considering that acculturated Puerto Rican mothers are more likely to employ modeling, there is potential for modeling healthy dietary practices. According to Berk (2008), the food environment is a powerful influence on children in a social context as children desire to imitate their parents and older siblings. Thus, the child will model the behavior of the parent's food-specific cultural norms.

a.   **<u>Acculturation and maternal and child health</u>**

From a sociocultural perspective, the Latino health paradox suggest that culturally rooted health behaviors and social networks protect the health of first-generation Latinos, and that as immigrants acculturate they lose these protective health factors (Viruell-Fuentes, 2007). Similar projections have been attributed to the diminishing protective health benefits of Latino children by the preschool years. According to Fuentes-Afflick (2006), maternal acculturation may be a risk factor for Latino perinatal and early childhood outcomes.

Acculturation has both negative and positive health effects (Abraido-Lanza et al., 2005; Lara et al., 2005). Negative effects or risk factors include substance abuse, nutrition, physical activity, and poorer birth outcomes (Lara et al., 2005). Risk factors are generally associated with higher levels of acculturation (Taningco, 2007). High levels of acculturation have been attributed to increased incidence of high risk behaviors (downward assimilation) (Betancourt et al., 2004).

Positive health effects or protective factors include increased use of health care screening and health care services, as well as better health status perception (Lara et al., 2005). Lower levels of acculturation have been associated with protective health behaviors (Taningco, 2007), healthier eating habits (Lara et al., 2005), and improved perinatal outcomes (Mendoza & Fuentes-Afflick, 1999).

However, there are mixed results that suggest both favorable and unfavorable health access and outcomes across levels of acculturation. For example, being less acculturated accounts for decreased use of preventive health care and increased perceived poor health status (Taningco, 2007), which may reflect or result in poor health outcomes. In addition, high levels of acculturation have been attributed to health-promoting behaviors, such as increased adherence to health care treatments. As previously noted Puerto Ricans have poorer outcomes, which may not be fully explained by acculturation.

b.   **Acculturation and maternal and child obesity**

Obesity has been found to contribute to chronic health conditions. Overweight Latino children are more likely to experience insulin resistance, and to develop T2D mellitus, metabolic syndrome, and obesity-related liver disease (Stovitz et. al., 2008). Obesity rates among Latino children are increasingly prevalent at younger ages. For example, Whitaker and Orzol (2006) found that by the age of three Latino children were twice as likely to be obese than their White or African American counterparts. This is a direct contradiction to the epidemiologic paradox that Latino children have more favorable outcomes at birth. Given that this greater obesity prevalence was not explained by maternal education, income, or food security, Fuentes-Afflick (2006) claims that maternal acculturation status may be contributing to

the variance between Latino children and other children. Evidence of increased risk profiles for diabetes, high blood pressure, asthma, diabetes, and mental health indicates that the propensity is more pronounced among Latinos with increasing levels of acculturation (Taningco, 2007). However, it is unclear whether early childhood overweight and obesity risk varies by maternal acculturation status (Fuentes-Afflick, 2006; Lara et al., 2005).

When immigrants assimilate to the host culture, they may adopt new behaviors that counter their native cultural norms, and may be harmful to their health. For example, a study assessing the impact of acculturation on Latino health found that highly acculturated Latinos (i.e., U.S. residents for more than 15 years) were more likely to become overweight or obese (i.e., high BMI rates) in comparison to recent immigrants or individuals residing in their native countries (Abraido-Lanza, Chao & Florez, 2005). This study suggests that acculturation increases the obesity risk among Latinos and in turn may influence child health. For example, evidence indicates that child birth weight has been indirectly attributed to maternal acculturation through health behaviors (e.g., diet and smoking) (Cobas et al., 1996); and, maternal BMI (≥ 30) has been positively associated with child obesity risk (Melgar-Quiñonez & Kaiser, 2004). However, studies observing Latino adult acculturation and weight status indicate that Latinos have the highest rates of overweight or obesity and heart disease across generations in comparison to non-Latino immigrants (Taningco, 2007). In other words, there were no generation differences for overweight or obesity or health disease. Similarly, research on the impact of maternal acculturation (e.g., generation status) on early childhood obesity found no association on the prevalence of preschoolers' overweight risk (Ariza et al., 2004). This may suggest that acculturation may not be a risk factor for poor weight outcomes and obesity-related risk among Latinos. Furthermore, acculturation as measured by language usage has not been

associated with obesity in Latina adults, particularly Puerto Rican women (Khan, Sobal, &

Martorrell, 1997). Thus, it is also important to note that Puerto Ricans do not present the same

favorable birth outcomes as other Latino subgroups. Namely, Puerto Ricans have a greater risk

for low birth weight (Mendoza, 1994), which may contribute to increased risk for adult obesity

(Parsons et al., 1999). Therefore, it is important to understand the acculturative process from a

Puerto Rican experience.

<div align="center">

c.   **<u>Acculturation and Puerto Ricans</u>**

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As previously noted, there is heterogeneity in health care outcomes and

the relationship between acculturation and health across Latinos. However, most studies

observing acculturation have been centered on Mexican Americans. In addition, acculturation

scales have been predominantly developed with Mexican samples, which may not be valid for

Puerto Ricans. For example, research comparing acculturation measures across Latino subgroups

indicates that Puerto Ricans have an acculturation experience in the United States that is unique

from that of Mexicans; and this may in turn impact their health outcomes differently (Lara et al.,

2005). This disparity supports assessing acculturation within the context of a Puerto Rican-lived

experience in order to understand how it may impact obesity.

In a longitudinal study of acculturation and overweight-related behaviors comparing

immigrants and U.S.-born Latino adolescents, Larsen and colleagues (2003) found that

acculturation (i.e., longer residence in the United States) predicted overweight among Puerto

Ricans. U.S.-born Latinos (i.e., generational status) were more likely to adopt overweight-related

behaviors, such as poorer diet and physical inactivity (Lara et al., 2005). This supports findings

that acculturation has a negative effect on Latino immigrants (Lara et al., 2005). However, after

controlling for acculturation, foreign-born Latino youth had a greater risk for overweight while

the risk for U.S.-born Latinos was minimal (Larsen et al., 2003). The investigators claimed that this contradiction was explained by socioeconomic disadvantages given that foreign-born Latinos were more likely to have lower maternal education, lower household income, and reside in isolated communities more densely populated by monolingual Spanish-speaking, Latino immigrants (Larsen et al., 2003).

Similarly, in the aforementioned study of Puerto Rican mothers in Connecticut, Anderson and colleagues (2004) found that acculturation did not predict maternal breastfeeding patterns, but rather socioeconomic and sociopolitical factors were better predictors. In addition, Canabal and Quiles (1995) used the Hispanic Health and Nutrition Examination Survey (HHANES) data to examine the impact of acculturation on depression among Puerto Ricans 20 years and older. The findings suggest that socioeconomic variables such as poverty status and unemployment are stronger predictors of depression than acculturation. Thus, in comparison to other Latinos in the United States, Puerto Ricans did not adhere to the common direct positive relationship between acculturation and social adjustment disorders. Therefore, acculturation instruments developed for Puerto Ricans may be necessary in order to better understand how Puerto Rican natives acculturate to American culture (Cortes, Rogler, and Malgady, 1994).

Recognizing the prevalence of biculturalism among Puerto Ricans, Cortes, Rogler, and Malgady (1994) conducted a factor analysis of first-generation and second-generation Puerto Ricans residing in New York and New Jersey to understand acculturation patterns by assessing levels of immersion or involvement with American and Puerto Rican cultures. The researchers found that generational status plays a role in the level of acculturation, whereby first-generation Puerto Ricans identified more with Puerto Rican cultural values and second-generation Puerto Ricans were bicultural (Cortes, Rogler, & Malgady, 1994). In addition, involvement in American

culture was inversely related to place of birth and age on arrival to the United States. This suggests that U.S.-born Puerto Ricans had a greater identification with American culture in comparison to Puerto Rican natives who were more likely to carry out Puerto Rican traditions. Length of residency (i.e., number of years in the United States) was the strongest predictor accounting for favoring American values. Place of birth and age on arrival to the United States were identified as the best predictors for involvement in Puerto Rican culture. Nonetheless, the investigators note the potential for variability with regard to the acculturative process even among Puerto Ricans living within the same community. Regardless of how Latino subgroups or Puerto Ricans acculturate to American culture it is necessary to consider other factors that may more prominently influence Latino health outcomes including income, education, and age, as well as the historical and geopolitical contexts (Perez-Escamilla, 2009) and stress (Caplan, 2007; Landale et al., 1999).

It is also necessary to acknowledge that most Latinos today do not feel the pressure to assimilate to American culture (Winebrenner, 2005). As a colonized people, island Puerto Ricans have been increasingly exposed to Americanization prior to arriving to the United States, which may further dilute the magnitude of the level of acculturation and foster a greater degree of biculturality (Cortes, Rogler, & Malgady, 1994). Given the variations among Latino outcomes by sex, geographic location, subgroups, class and other socioeconomic factors, the Latino paradox may actually be attributed to a Latino norm (Hayes-Bautista, 2002). In other words, the patterns of health outcomes associated with Latinos may actually be due to normal Latino health patterns. However, noting that Puerto Ricans have different morbidity and mortality patterns, it is evident that more needs to be understood about the Puerto Rican history and lived experience in

relationship to health behaviors and outcomes to uncover reasons for the pronounced disparities that seemingly do not contribute to an acculturation benefit.

5.   **Puerto Rican historical perspective in the context of women**

Since the 1860s Puerto Ricans were migrating to New York City and other parts of the United States for reasons such as employment, education, and political organizing. In the 1860s Puerto Ricans were meeting with Cubans in New York City to organize a political movement for independence from Spain. These meetings between Puerto Ricans and Cubans in New York City triggered events such as *El Grito de Lares* in Puerto Rico, which was a period during which Puerto Ricans, for a very short time, declared independence from Spain (Rodriguez & Delgado, 1998, 172). Puerto Rican women during this period continued to fill roles that had been traditionally racialized (Rodriguez, 1998a). For example, Black and colored women, most of whom were slaves, primarily worked as cooks or servants. Women also worked as laundresses. Most of the domestic workers were single, heads of the household. However, in the time of the impending abolition of slavery, women began to rebel against the poor working conditions, which resulted in a considerable shortage of female domestic workers. In an effort to control workers, Spanish authorities instituted regulations in 1864 that required workers to be obedient, loyal, and respectful of their employers. Women who did not comply were subjected to harsher penalties than their male counterparts including having to pay fines or go to jail. The struggle for fair labor rights among women continued post-slavery.

Starting in the 1920s, due to the decline of the sugar cane industry in Puerto Rico, along with the population growth, high unemployment, poverty, and desperate conditions, thousands of Puerto Ricans migrated to places like Brooklyn, New York and other east coast cities. These

factors along with the forced U.S. citizenship in 1917 under the Jones Act propelled the first wave of Puerto Ricans to the United States in the 20th century (Ramos, 1998). These Puerto Rican workers moved to places such as Hawaii, Arizona, Philadelphia, and especially New York City (Rodriguez, 1998b). The labor market in Puerto Rico continued to be clearly "sex-segregated" (Ortiz, 1998). Puerto Rican women, who were already accustomed to the production and service labor markets while Puerto Rico was a colony of Spain, continued to take employment as domestics and laundresses, as well as seamstresses. By the 1930s, women in Puerto Rico began to enter new roles as office workers, needleworkers, and garment workers among other less prominent roles. In addition, women on the island found new opportunities in the tobacco industry. However, because they endured excessively long work hours in deplorable conditions for extremely low wages, the females also emigrated to the United States to pursue work in the clothing industry (Ortiz, 1998).

Although a progression of Puerto Ricans began to migrate in the 19th century, the largest population to migrate to the mainland United States was in the late 1940s and early 1950s and extended with considerable fluctuations, throughout 1960s and beyond (Suarez-Orozco & Paez, 2002). Thus, Puerto Ricans became the largest Latino subgroup populating the Northeastern coast of the United States. The migration of 70,000 Puerto Ricans to the United States marked an all-time high in 1953 alone (Ortiz, 1998). From the late 1940s to the 1960s, the stateside Puerto Rican population grew from about 70,000 to almost 1.5 million people, more than half of whom took up residence in the New York City area (Suarez-Orozco & Paez, 2002). The majority of the migrants were blue-collar workers seeking better employment opportunities. A significant number of children were among the newcomers. As these children entered the educational

system, the need to provide them Spanish-speaking educators allowed educated women from Puerto Rico to expand into the teaching field.

Since the 1960s, shifts in the job market influenced a decline in the participation of Puerto Rican women in the labor force. The fading garment industry, the growth in female headed households, and the increased opportunities for highly educated Puerto Rican women contributed to the changing market (Ortiz, 1998). However, in the 1970s and 1980s, Puerto Rican women continued to struggle to enter expanding female workforce opportunities in professional, clerical, and sales occupations because these were already predominantly occupied by White and African American women. Nonetheless, although most Puerto Rican females worked in clerical positions between the 1980s and 1990s, they still were predominantly undereducated and underclassed.

Today, Puerto Ricans are one of the most transnational people, traveling back and forth seeing family and even residing in both U.S and Puerto Rican towns for employment and/or education purposes. Besides the aforementioned cities, the Puerto Rican diaspora continues to grow as Puerto Ricans have carved out small communities in places such as Chicago, Connecticut, Boston, Orlando, and Newark, New Jersey (Suarez-Orozco & Paez, 2002). Unfortunately, negative consequences of transnationalism and the control of the U.S. government are reflected by the development of health issues resulting from gas emissions from mainland U.S. corporations, the pollution caused by years of bombing by the U.S. military on the island, and the production of stereotypes of Puerto Ricans as a complacently welfare dependent people (Ortiz, 1998). In addition, the U.S. sterilization project on both the mainland and the island that left over 35% of Puerto Rican women between the ages of 14 and 45 barren (Soto, 1997), influenced much skepticism towards the American government and the medical industry

alike (Whalen, 1998). Furthermore, as consequence of a history of oppression and a transnational existence, which some argue has fragmented Puerto Rican culture, Puerto Rican women on the island and the United States aim to preserve their cultural identity, values, and traditions (Ramos, 1998).

a. **Puerto Rican sociocultural identity and health**

In understanding health behavior among Puerto Ricans, it has been claimed that cultural identification supersedes all other factors (Perez-Peña, 2010). Puerto Rican cultural identity is rooted in the cultural exchanges between native Taino Indians, the Spanish, and Africans; however, of the three historically dominant cultural influences, African culture is the most prominent from an economic, social, and cultural perspective (Gonzalez, 1990). For example, Puerto Rican life-habits were shaped by the island poor, the African slaves, and their traditions (e.g., African cuisine). Two approaches have been used by sociologists to define ethnic identity as affiliation to a group as part of: (1) a shared cultural heritage or (2) a social organization united to address collective interests or issues, such as inequality, racism, discrimination, and the like.

Historically, the "Americanization" of Puerto Ricans, which began in Puerto Rico in the early 1900s, has been instrumental in the production of a bicultural identity. The efforts towards the American assimilation of Puerto Ricans were driven by two competing social and political agendas. For some, the primary objective was to reform a society that was suffering from "moral decay" (Ramos, 1998). Others' main goal was to institute republican and democratic sociopolitical structures (Ramos, 1998). However, the Americanization project of Puerto Ricans extended beyond social assimilation to political assimilation. Thus, Americanization not only intended for Puerto Ricans to adopt American cultural norms and values, but to foster American

political views as well (Ramos, 1998). Similar efforts were incorporated in the United States, particularly as children were Americanized through the school system (Ramos-Zayas, 2003). Consequently, Puerto Ricans felt simultaneously pressured to Americanize while maintaining their national identity. Thus, the bifurcation of the sociocultural identity of Puerto Ricans in the United States has produced a dual or bicultural identity that is immersed in both American policies and Puerto Rican cultural values (Cortes, Rogler, & Malgady, 1994).This pressurized existence has also lent to a culturally unique experience as being "not from here or there" (Korzenny & Korzenny, 2005). As Puerto Ricans continued to negotiate their national identity in the face of American influences, the diaspora communities of Puerto Ricans are characterized by the emergence of bottom-up social identities including *Nuyoricans* and/or *Boricuas* (Aquino, 2004). As Puerto Rican migrants settled predominately in New York City during the early part of the twentieth century and beyond, the hybrid Nuyorican cultural identity emerged which reflected a Puerto Rican experience on the mainland while retaining cultural roots from the island (Flores, 1980). Boricua identity is a reaffirmation of Puerto Rican culture pre-colonization during which the island of Puerto Rico was known by the indigenous Tainos as *Borikén* (presently referred to as Borinquen) meaning "The Land of the Valiant and Noble Lord or People" (Perez & Gonzalez, 2000). Nevertheless, the authenticity of a Puerto Rican cultural identity is often disputed among Puerto Ricans across communities in the diaspora.

The dilution of Puerto Rican culture due to transnationalism and American influence in the United States and in Puerto Rico contributes to divided borders (Flores, 1998) and cultures whereby Puerto Rican islanders question the *Puertorriqueñidad* (Puerto Ricanness) of Puerto Ricans on the mainland (Soto, 1997). Thus, the marginalized experience of Puerto Ricans is pervasive on both the mainland and the island (Soto, 1997). Not only is the Puerto Rican identity

contested across borders on the mainland, Puerto Rican identity is sometimes challenged by a person's political affiliations. For example, it is believed that in Chicago Puerto Ricanness is defined by a person's sociopolitical consciousness and support of the Puerto Rican political movement for independence (Ramos-Zayas, 2003). Nonetheless, Puerto Rican cultural identity in Chicago is also exacted by class identities. Namely, Chicago Puerto Ricans have been traditionally identified as being underclassed and poor; therefore, middle-class Puerto Ricans have relocated from *the barrio* (neighborhood) to the suburbs (Ramos-Zayas, 2003). Thus, Puerto Ricanness in Chicago is also defined by spatial identities of HP residents, primarily those concentrated on the barrio or Division Street area known as Paseo Boricua (Boricua/Puerto Rican Promenade) (Ramos-Zayas, 2003).

In addition, Puerto Ricans in the United States have also assumed a Latino or Hispanic ethnic identification, which serves to strengthen and complement "ethnic consciousness" (Padilla, 1985). Latino identification within the context of a lived experience in the United States is a transient identity for social action that is influenced by locality, sociopolitical power, and concentration of individuals from two or more Latino subgroups (Padilla, 1987). The greater the perceived discrimination the more likely an individual is to identify with his or her cultural heritage (Padilla, 1987). Thus, cultural identity converges with class identity and spatial identity (Ramos-Zayas, 2003). In the United States, where class is racialized and ethnicized, Puerto Rican cultural identity is generally referred to as the paradigmatic poor or underclassed and has thus generally produced a deficit-focused image of Puerto Ricans as poor and uneducated rather than proactive community organizers and concerned citizens (Ramos-Zayas, 2003). These realities add to the complexity of a bicultural identity in the dynamic and multidimensional cultural identity process. Consequently, Puerto Ricans may hold both a Latino and a Puerto

Rican cultural identity (Padilla, 1985), as well as an American identity (Cortes, Rogler, & Malgady, 1994). However, the American influence on Puerto Rican's cultural experience in the United States extends beyond the westernized, Euro-American culture to other groups, such as African Americans.

Some Puerto Ricans in the United States may identify more with African Americans than Euro-Americans because of the spatial reality of shared neighborhoods, predominantly in poor communities (Zentella, 1987). African consciousness has been significantly associated with cultural identity and health consciousness, particularly dietary behavior, which suggest the need for explanatory models of African American cultural identity for understanding health behaviors (Zentella, 1987). Similar relationships between Puerto Rican consciousness and health behavior may provide insight to the complex roles played by culture and cultural identity of Puerto Rican dietary behavior and weight outcomes.

Consequently, it has been purported that sociocultural identity is a better indicator of Puerto Rican health behavior than acculturation (J. Arrom, personal communication, January 26, 2010). For example, investigators have found social class to be a stronger indicator of Puerto Rican cultural values in comparison to the length of residence in the United States (Arcia, Reyes-Blanes, & Monilla, 2000). In addition, the cultural identification of an individual may more closely influence their behavior as opposed to language preference, especially among Puerto Ricans who are more likely to be bilingual. Research on Latino ethnic identity and health across Latino subgroups corroborates that ethnic identification influences how individuals perceive social acceptance, and in turn, may impact health behavior and care seeking behavior (Arcia et al., 2001). Cultural adaptation or behavioral changes that occur as a progression of thriving in a new cultural environment are influenced by social identity (Cortes, Rogler, & Malgady, 1994).

It is important to acknowledge that race and ethnic categories have historically been used to marginalize minority groups into low status, while affording the majority access to privilege, power and wealth (Henderson & Estroff, 2005; Lee, 2001). The identification of race has led to unethical practices of social inferiority and inequality. In addition, physical and behavioral traits have been erroneously used to stigmatize individuals from racialized groups. Similarly, culture integrates human behavior and encompasses institutions of racial, ethnic, religious, and social groups. Differences in cultural views on health shape life experiences and impact responses to infirmity, dietary and health habits, and patterns of care as well as society's response to social groups. Thus, concepts of health, illness, and disease are closely culturally ingrained and vary cross-culturally (Levin & Browner, 2005; Martinez, 2005). To further understand these variances, it is necessary to define illness and disease and distinguish the differences between them. Illness is a variant and subjective social construct determined by the meaning and lived experiences expressed through feelings of pain, discomfort, and loss or change in physical or mental functioning that may or may not be associated with disease within a given culture. On the other hand, disease is marked by invariant and objective biophysiological changes in the body (Martinez, 2005). This distinction is important because an individual's social identity may influence how they culturally view their state of well-being.

Among Puerto Ricans, the experience of *nervios* (nervous attacks) is a normal response to suffering and distress that does not necessarily equate to the presence of mental illness (Guarnaccia, Lewis-Fernandez, & Marano, 2003). Although commonly used among Latinos to describe individual behavior, nervios has been inappropriately used by U.S. military personnel to describe disease as well as stigmatize Puerto Rican men as defective. However, because nervios is not anxiety, the addition of nervios in the DSM-IV has increased awareness and understanding

of the impact of this folk illness on the morbidity and mortality of Latinos and demonstrates

acceptance and respect for their cultural definition of illness (Baer et al, 2003). Stress

predisposes individuals to illness and disease and thus, individuals of Latino heritage may incur

greater risk for infirmity (Caplan, 2007). For example, the Puerto Rican Maternal and Infant

Health Study revealed that in comparison to their U.S.-born female counterparts in Puerto Rico,

recent Puerto Rican migrants were less likely to experience stressful life events, to engage in

risky behaviors during pregnancy, and to have better infant health outcomes (Landale et al.,

1999). Stressors are believed to be triggered by a lived experience as a marginalized society,

particularly among second-generation U.S. migrants (Kaplan & Marks, 1990). Generational

variations in acculturative stress and perceived stress have been attributed to differences in

cultural orientations (Kaplan & Marks, 1990). Evidently, cultural differences in the perceptions

of health have resulted in both negative and positive societal responses, which vary within and

between cultures. However, there is little evidence to indicate whether and how Puerto Rican

ethnic orientation, as well as cultural values and beliefs rooted in ethnic identity, may influence

health behavior.

b.   **Puerto Rican cultural values and beliefs**

Differences in cultural values and beliefs shape life experiences and

impact responses to infirmity, health habits, and patterns of care as well as society's response to

social groups. Cultural values for *familismo* (the importance of family and need for family

approval), *simpatia* (the need for avoiding interpersonal conflict), and collectivism (the

importance of community identity and interdependence) have been known to deter risky

behavior in Latino children (Lara et al., 2005). Thus, even the nuclear family can act as a

protective factor as enculturated values are supported by building a sense of we-ness or insider (*emic*) versus outsider (*etic*) view (Santos, 1997).

In particular, the social identity theory posits that social structures of collective group membership, such as cultural affiliation, guide individual perceptions and behavior (Padilla & Perez, 2003). This may be particularly salient among Puerto Ricans and other Latino subgroups given the cultural value for collectivism. Thus, a collective cultural orientation may have a protective effect attributed to social support (Landale et al., 1999). Namely, having a collective *sense of community* or a supportive community environment has been cited among the factors that contribute to more favorable outcomes among Puerto Ricans. For example, Latina women who were reared in predominantly Euro-American neighborhoods where they were subject to discrimination reported that their immediate family unit served as a buffer to racism (Bathum & Baumann, 2007). Similarly, Puerto Rican women across generational status have more favorable birth and infant health outcomes when they have the social support of living with extended family members and sharing human and financial capital (Landale et al., 1999).

Nonetheless, *respeto* (the belief in respect and obedience towards elders, males, and other authority figures) is among the most saliently regarded values in Puerto Rican families (Comas-Diaz & Duncan, 1985) that is enforced on children. A comparative study of the cultural values sustained by Puerto Rican mothers in comparison to their White counterparts found that Puerto Ricans placed a greater value on child respect towards elders and obedience over child autonomy (Harwood et al., 1996). Although SES and ethnic identity were found to contribute to differences in cultural values between Puerto Rican and Anglo mothers, culturally ingrained values were stronger predictors of between group differences. Even across generations, lower class, mainland Puerto Rican mothers were more likely to maintain cultural values similar to island Puerto Rican

mothers than their lower class Anglo counterparts   (Harwood et al., 1996). A high value for

parental authority or respect may influence children to adhere to dietary practices that support

overeating and contribute to child overweight. However, the dietary feeding practices employed

by Puerto Rican mothers are poorly understood.

<p style="text-align:center">c.   <u>Puerto Rican food culture and dietary patterns</u></p>

As a colonized territory, food culture in Puerto Rico is influenced by an

amalgamation of Spanish and African heritages along with native traditions carried from the

Taino Indians. The Tainos contributed fruit, corn, cassava, game, and seafood representative to

the "Puerto Rican diet." From the Spanish, natives acquired beef, pork, rice, wheat, garlic, and

olive oil. Elements from African cuisine were interwoven in the Puerto Rican diet including

plantains, bananas, yams, and taro among other root vegetables as well as coffee, coconut,

sesame seeds, okra, *gandules* (pigeon peas), and poultry. In addition, African women contributed

some signature dishes like *pasteles* (a stuffed plantain dough), and *mofongo* (a ball of mashed

fried plantain). Puerto Rican cuisine is also less prominently inspired by mid-nineteenth century

migrants from China, Italy, Corsica, Lebanon, Germany, Scotland, and Ireland as well as peoples

from the neighboring Caribbean islands of Cuba and the Dominican Republic (Houston, 2005).

A cultural philosophy of *making do,* unique to the Caribbean islands, is a subversive

strategy evolving as a survival mechanism marked by a history of slavery and servitude

(Houston, 2005). Making do is described as utilizing cooking resources and any foods available

for meal preparation from your own backyard. Thus, women regard it as a form of liberation and

empowerment because they are able to be self-sufficient and creative in their cooking by making

do with what is accessible rather than figuratively depending on the American economic

structure of overpriced supermarket items. However, purchasing fresh goods from local farmers'

markets was also very popular. In addition, it was typical for women to cook together and share life experiences. Depending on fresh produce from homegrown gardens as a primary source of sustenance can have health benefits; however, in economically disadvantaged communities making do can sometimes have a negative effect marked by malnutrition and illness if it implies having to do without certain food products that may be inaccessible. Thus, *la cocina criolla* or traditional Puerto Rican cuisine emerged from a rich food history of blending flavors from immigrant cultures and making do.

The traditional Puerto Rican diet includes an abundance of fresh fruits and vegetables, legumes, and rice. Historically, salt was not known to be common with the exception of Tainos using sea water for cooking or fish that had been cured in salt for preservation. Thus, this suggests that the traditional Puerto Rican diet is healthy. However, as the U.S. fast food industry began to establish itself in Puerto Rico in the 1960s and 1970s initially targeting the tourist market, Americanization also began to infiltrate the dietary patterns of island natives. Consequently, local farmers' markets and roadside stands started to fade as supermarkets featuring imported, processed, and canned goods became more prominent. Furthermore, as Puerto Rican nationals migrated to the United States their dietary patterns continued to evolve.

Research observing Puerto Rican dietary patterns and specific food deficiencies encountered by Puerto Ricans who migrated to the United States provides evidence of a shift from the traditional diet to patterns more indicative of diminishing health benefits. A historical analysis by Sanjur (1995) demonstrates that in the 1940s Puerto Ricans in the United States who were extremely poor had limited fruit consumption because it was not affordable. In the 1960s, once Puerto Ricans began to benefit from better incomes, the diet of Puerto Ricans in the United States was more characteristic of a nutritious diet; however, the Puerto Rican diet still appeared

to be lacking in fruits and vegetables in the 1970s. In addition, patterns of overconsumption began to emerge and were indicative of malnutrition particularly among the poor, although some Puerto Ricans who were receiving food stamps were able to benefit from better diets (Sanjur, 1995). Similarly, a comparative analysis of the food patterns of Puerto Ricans on the island and Puerto Ricans in New York, revealed patterns of overconsumption of high-protein foods in United States and Puerto Rico as well as beverages high in sugar in Puerto Rico (Sanjur, 1995) These patterns paralleled overweight and obesity among women. However, the researchers also found that Puerto Ricans in the United States in comparison to their island counterparts were consuming more fruits and vegetables as well as a more diverse diet. Given the predominant migration of Puerto Ricans to New York and the neighboring states, most of the research on Puerto Rican nutrition and health to date has been conducted in the eastern states.

In the Chicago community of HP, a recent study by Estarziau and colleagues (2006) revealed that Puerto Ricans may have less healthful diets. For example, in comparison to their Mexican counterparts, Puerto Ricans adults and children were less likely to consume the daily recommended fruits and vegetables. In addition, Puerto Rican children were not consuming the daily recommended dairy intake. Puerto Rican children were also more likely to consume high sugar foods like cookies in comparison to their Mexican children, although the consumption of doughnuts/munchkins was more prevalent among Mexicans than Puerto Ricans. Chicago Puerto Rican and Mexican children also have high intakes of sweetened beverages including soda. Food insecurity is among the contributing factors to the status of the Chicago Latino diet and Puerto Ricans have been found to be more food insecure (Chavez, Telleen, & Kim, 2007). Specifically, a study of Latina mothers with young children who reside in the Chicago communities of West Town, HP and Logan Square found that Puerto Ricans experienced more severe food

insufficiency than Mexicans and other Latinos (Chavez, Telleen, & Kim, 2007). The high cost of

fruits and vegetables has been frequently reported as a barrier in this community (Community

Organizing for Obesity Prevention, 2006). Furthermore, the community is a designated food

desert, which means there is inadequate access to fruits and vegetables. Other common reasons

for not eating healthy were limited time, feeling stress, being alone, and eating as a reward.

Puerto Ricans were less likely than Mexicans to perceive child overweight as a problem;

however, Puerto Rican parents were more likely than Mexicans to actively modify their

children's diet. Nonetheless, the strategies employed by mothers to successfully incorporate

dietary changes in their children's diet are unknown.

Poverty, food prices, personal, family, and health problems were among the reasons

given by Puerto Ricans for changing their diet (Sanjur, 1995). However, there were apparent

historical patterns of food consumption among Puerto Ricans in the United States. For example,

income determined food consumption. In addition, poverty and, more principally, powerlessness

account for the manifestation of malnutrition from both undernutrition and overnutrition (Sanjur,

1995). Furthermore, poverty as it relates to holding weaker political power and lower social

status has been associated with greater obesity risk (Sanjur, 1995).

d.   **Puerto Rican health behavior and outcomes**

Children acquire preventive health behaviors practiced by their parents

during early childhood. The preschool years are a critical learning period for establishing

nutritional habits as well as physical and cognitive development (Flores & Zambrana, 2001).

Puerto Rican children in the United States are more likely to suffer from chronic conditions in

comparison to other Latinos (Mendoza, 1994). Consequently, Puerto Rican mothers are more

likely to report their preschool children as being in poor health (Mendoza, 1994). This suggests that Puerto Rican children may have greater exposure to behaviors that place them at risk of developing illness. Poverty, limited health care access, and urban residence among Latinos are among the reported barriers associated with disproportionate rates of morbidity, suboptimal health, and underutilization of health care services that challenge the health status of Latinos (Flores & Zambrana, 2001).

According to data from HHANES, Latino children, generally, have lower immunizations rates in comparison to their White counterparts; however, the rates vary by Latino subgroups (Niederhauser & Stark, 2005). Although Puerto Ricans do not incur the lowest inoculation rates, they are still less likely to be immunized than White children (Niederhauser & Stark, 2005). Latinos also have limited access to oral health care, which has been attributed to dental corrosion in nearly 33% of preschool children (Flores & Zambrana, 2001). Puerto Ricans seem to be disproportionately impacted by oral health issues (Ismail & Szpunar, 1990). For example, Puerto Ricans have also been found to have the highest prevalence of fillings, lost teeth, and periodontal disease (Ismail & Szpunar, 1990). When untreated, dental decay can impact the overall quality of life and contribute to nutritional and learning deficiencies (Telleen et al., 2012; Flores & Zambrana, 2001). In addition, less than 2% of Puerto Rican, Mexican, and Cuban children two years or younger experience iron-deficiency anemia (Mendoza, 1994); however, by the preschool years Puerto Rican children have higher rates (1.3%) than other Latinos (0.5%), even though the rates are still lower (5%) than the national average (Flores & Zambrana, 2001).

Mendoza & Fuentes-Afflick (1999) found that Puerto Rican children also have a higher prevalence for chronic illness and disabling conditions than other Latino children. Similarly, data from HHANES (1982–1984) concluded that U.S. children of Puerto Rican descent had a greater

occurrence of chronic disease by the age of six (Flores & Zambrana, 2001). Puerto Rican preschool children have a higher prevalence of developmental conditions and functional limitations (Flores & Zambrana, 2001), and elevated rates of chronic diseases (Mendoza, 1994) including asthma (Lara et al., 1999; Lara et al., 2006; Mendoza, 1994). In addition, Puerto Rican children comprise two thirds of the approximately 500,000 asthmatic Latino children (Flores & Zambrana, 2001). Similar high rates of asthma have been found in children living in Puerto Rico. Obesity has been identified among the risk factors for asthma (Perez-Perdomo et al., 2003). For example, a cross-cultural study of children age four to sixteen revealed that children with asthma were more likely to be obese or overweight than a control group of children without asthma (Gennuso et al., 1998). Mendoza (1994) claims that eliminating asthma among the chronic conditions affecting Puerto Rican children would grant them comparable or favorable outcomes in comparison to their Euro-American counterparts.

Obesity also has a significant impact on the health of Puerto Ricans. For instance, a case-control study aiming to identify predictors of childhood obesity in prepubescent Puerto Rican children living in Hartford, Connecticut found that obesity was correlated with a greater frequency of fruit consumption, hours of daily TV viewing, maternal BMI, and lower dairy product intake (Tanasescu et al., 2000). Obesity has also been attributed to early onset of diabetes, which corresponds with findings that Puerto Ricans generally have greater morbidity and mortality for diabetes (Whitman, Silva, & Shah, 2006). The obesity epidemic among children in Puerto Rico is reflected in over one-quarter of children on the island, which exceeds rates of mainland Puerto Rican youth (Melia, 2007). In addition, a retrospective study of medical records from 1995–2003 on the prevalence of T2D among Puerto Rican youth under the age of twenty years residing in Puerto Rico revealed that children between the ages of ten and fourteen

incur the highest risk of developing T2D (Perez-Perdomo et al., 2005). The most common risk factors included female sex, being overweight, and having a family history of diabetes (Perez-Perdomo et al., 2005). In a cross-cultural study of Philadelphia residents, Lipman, Chang, and Murphy (2002) found that Puerto Rican children have the highest incidence of Type 1 diabetes, which parallel rates in Puerto Rico and Chicago.

Puerto Rican children also have higher rates of neonatal and infant mortality (Mendoza, 1994). The rates persist even among births of island-born Puerto Ricans (Mendoza, 1994). Puerto Rican mothers are also more likely to give birth to infants with low birth weight and preterm births (Medoza, 1994). However, Latino children including Puerto Ricans are less likely to be born with physical or mental congenital anomalies (Mendoza, 1994). Puerto Rican women also have greater rates of labor and delivery complications (Giachello, 2001). Moreover, being younger, having lower SES, single-parenting, and tobacco use during pregnancy can further compound prenatal, infant, and child health. For example, U.S.-born Puerto Rican mothers are less likely to seek prenatal care during the first trimester than their island-born counterparts (Giachello, 2001). Child birth factors among Puerto Rican children have been attributed to maternal factors, particularly a greater likelihood to be underweight during pregnancy, develop gestational diabetes, have hypertension, be anemic, and experience uterine bleeding (Giachello, 2001).

Despite the higher rates of underweight among pregnant women, Puerto Rican mothers are more likely to be obese, especially among women with low SES (Fitzgerald et al., 2006). In addition, higher rates of asthma, HIV/AIDS and sexually transmitted infections as well as depression among Puerto Rican women can also impact poorer infant and child health outcomes. According to a recent CDC report on adult depression in the United States and Puerto Rico,

island Puerto Ricans have the second highest rate of depression (14.7%) after Virginians (14.8%), with higher rates for women in comparison to men (CDC, 2010). Researchers have found comparable rates of depression for mainland and commonwealth Puerto Ricans (Vera et al., 1991). However, depression is not among the five primary reasons of mortality among Puerto Ricans in the United States. The five leading causes of death for Puerto Rican women in New York include heart disease, cancer, T2D, influenza and pneumonia, and chronic lower respiratory disease (New York Health Department, 2008). Similar statistical morbidity and mortality data in Chicago demonstrate variances across adult females by age group categories. Generally, heart disease, cancer, diabetes, stroke, and chronic lower respiratory disease were the primary causes of death for Puerto Rican women. However, cancer was the leading cause of mortality among younger Puerto Rican women age 25–44 (Chicago Department of Public Health [CDPH], 2006).

Nonetheless, statistical data of Latinos residing in the United States demonstrate that they have a high risk of developing CVD (e.g., leading cause of death is attributed to heart attacks). Considering that Puerto Rican women have higher rates for most of the risky behaviors associated with CVD (e.g., smoking, obesity, hypertension, and diabetes) than any other Latino subgroup, it may be projected that they have a greater risk of developing CVD. Particularly, Puerto Rican women are twice as likely to smoke in comparison to Latinas from other subgroups (Kanna et al., 2008). Although the hypertension-related mortality rate for U.S. Puerto Ricans declined a little between 1995 and 2002, Puerto Ricans continue to have the highest death rates throughout this period in comparison to their Latino and Euro-American counterparts. The higher hypertension-related mortality rates among Puerto Ricans have been linked to a greater propensity for hypertensive risk factors, including diabetes mellitus, obesity, and physical inactivity (CDC, 2006).

Landale and colleagues (1999) identified risk and protective factors of Puerto Ricans. Protective factors were defined as strong family support and cultural orientation. Conversely, risk factors were determined by meager neighborhood factors including limited human capital, low income, and residence in a disenfranchised community (Landale et al., 1999). Thus, less favorable chronic disease morbidity and mortality persist among Puerto Rican adults, particularly women of child-bearing age (Giachello, 2001), despite the fact that they have access to higher rates of insurance coverage because of their citizenship status (Mendoza & Fuentes-Afflick, 1999). However, over 25% of Puerto Ricans are uninsured (Hayes-Bautista, 2002) with less than 9% receiving some form of government-based medical coverage.

D.   **Limitations of the Literature**

Despite the growing and emerging research addressing childhood obesity, there are limitations in understanding the appropriateness of anthropometric indicators for use with children. Of equal importance are the lack of evidence that explains the contribution of mothers across Latino subgroups on the development of child weight status, the feeding strategies they employ, and how these may impact the development or prevention of child overweight. In addition, in uncovering the influence of culture on maternal and child health behavior and outcomes, there are challenges posed by the inadequate use of acculturation measures and scales.

1.   **Limitations of anthropometric measures**

In measuring adult and child nutritional and weight status, BMI is commonly employed for its ease, cost-effectiveness, and consistency. Using BMI can be beneficial because high specificity is needed in order to avoid inaccurate identification of non-obese children as obese (Type I error) (Reilly et al., 2000). In addition, for purposes of clinical diagnosis, when

specificity of the diagnosis is high, low sensitivity is regarded as acceptable (Reilly et al., 2000). However, epidemiologically, low sensitivity is problematic because BMI can substantially underestimate obesity prevalence. Therefore, the treatment of non-obese children as obese can lead to stigma associated with being labeled obese, and potential for subsequent harm.

In addition, Prentice and Jebb (2001) note disadvantages of using BMI as including misleading interpretations by age, race, athletic build, exercise regime, and health status. The use of BMI is particularly criticized for its inability to estimate true increase in body fatness that occurs as a result of aging (Prentice & Jebb, 2001). Racial and ethnic groups may also exhibit different relationships between BMI and body fat, which may not be reflected by the CDC Growth Charts, given that these use aggregate samples of children across all racial and ethnic groups (Guo et al., 2000). Thus, it is important to recognize that researchers believe that Black children may be inappropriately labeled as overweight or obese because BMI incorrectly overestimates their values, while for Asian children it underestimates their values and incorrectly predicts that they are leaner than they really are. The appropriateness of BMI for Latino samples is poorly understood. Nevertheless, as long as appropriate cut-offs are used in children, BMI limitations can be minimized (Reilly et al., 2000).

Among adults, BMI cut-offs may also incorrectly assess body fatness in athletes and military and civil forces personnel who generally have more developed musculature and less body fat as a result of extensive physical training (Prentice & Jebb, 2001). Weight loss can also lead to misleading interpretations of BMI as a predictor of weight status. Weight loss will vary as a result of whether or not a person exercises because weight loss does not necessarily indicate fat loss. In the process of losing fat, lean tissue is also lost unless the individual exercises to rebuild lean muscle mass. The degree of body fatness also varies by the type of exercise practiced. For

example, strength or resistance training help produce more muscle mass than cardiovascular training.

As an alternative, research indicates that WC is a better predictor of weight-related health risks for adult women than BMI (Lofgren et al., 2004). On the other hand, it has been claimed that the combination of BMI and WC has stronger predictability of the variance for disease risk indicators (Jansenn et al., 2004). However, these studies and the respective WC cut-off standards were based predominantly on Caucasian adult samples. More research is needed to determine the appropriateness of utilizing BMI and WC in Latino adult and child samples as indicators for anthropometric outcomes. Furthermore, most studies observing parental-feeding practices do not observe the impact on child weight, and those that do consistently use BMI as a measure of overweight.

2.   **Limitations in the literature of child-feeding practices**

In order to develop lifelong healthful dietary habits, children "need early, positive and repeated experiences" with healthy foods like fresh fruits and vegetables (Savage, Fisher, & Birch, 2007, 31). Because children are dependent on their parents, parental guidance is essential for the development of dietary preferences through food availability, modeling, and verbal cues.

Researchers believe that by identifying parental perceptions about diet, weight, and health, appropriate tools can be employed to educate parents about healthy body size and the consequences of poor diet and feeding-practices. Reifsnider and colleagues (2006) employed tools for educating Latino parents on appropriate children's body-size strategies. However, because these were not culturally appropriate tools, they may have impacted the mothers'

inability to identify the photographed children with their own. Age and culturally appropriate images are essential when using pictures or diagrams to educate parents about weight.

There is also limited understanding regarding the concept of body size indicators and how these are determined. Research aimed at measuring BMI and body size (Reifsnider et al., 2006) does not include anthropometric measures of skin folds or WC. In addition, studies centered on educating parents about appropriate BMI and body-size proportions are void of explaining parental influence on health and nutrition, appropriate dietary guidelines, and the related consequences. Thus, parents who are unaware of the problem with their child's overweight may provide unhealthful choices or fail to encourage physical activity (Reifsnider et al., 2006).

Child-feeding practices are complex; thus, the influence of psychological factors employed during child feeding in the mother-child dyad is often overlooked and understudied. More evidence-based knowledge is needed on maternal child-feeding strategies, especially including verbal cues and their impact on obesity development. While there is limited research on the influence of parental verbal cues on children's hunger and satiety cues, the impact of maternal verbal cues in Latino family dynamics has not been observed.

Furthermore, few studies observe child-feeding practices and the development of eating behaviors cross-culturally. In studies where ethnically diverse samples are assessed, some findings may be compromised by small sample sizes particularly for Latinos or Latino subgroups. For example, Galloway and colleagues (2006) compared White, Asian, and Latina mothers, but the Latino sample was small (n=2). Similarly, Sherry et al. (2004) observed White, Latina, and African American mothers from disparate socioeconomic backgrounds, but the

sample used an aggregate of Latino subgroups. Therefore, the study did not capture differences across subgroups and findings may not be extrapolated to the general population. There is also limited research on verbal cues and their impact on weight, particularly among Latinos. In addition, some studies observing child-feeding practices used national samples from the mid-1980s. Given the increased prevalence of childhood overweight in the last two decades, the samples extracted for these analyses may be not generalizable.

Another potential limitation is related to the fact that most evidence is limited to the mothers' self-report of their children's practices, which could be subject to recall bias (Orrell-Valente et al., 2007). Thus, there is a need for child outcomes data. In addition, some instruments used to measure child-feeding practices have been limited to a laboratory controlled environment. Thus, these tools may lack external validity for measuring child-feeding practices in the home environment without further validation. Power analysis when appropriate was generally not reported with the exception of a study that was notably underpowered.

There is also a lack of instruments tailored toward Latino children; when these are available they are usually not culturally appropriate or linguistically appropriate (Flores et al., 2002). In addition, studies may not observe the impact of other contributing or confounding factors, such as acculturation (Lara et al., 2005). For example, it is important to note mixed results for Latino consumption of fruits and vegetables and physical activity, which may be mediated by acculturation.

Very little research observes Latino youth, particularly Puerto Ricans. Some national statistics of childhood overweight in Latinos like the National Health and Nutrition Examination Survey (NHANES) were based on samples of Mexican American children (Ogden et al., 2002),

which may not be generalizable across Latino subgroups. Data available focus on middle childhood and adolescents with an emphasis on school-based interventions and thus may not benefit from reinforcement and maintenance at home. Thus, the influence of the family on child overweight outcomes has been emphasized (Stovitz et al., 2008; Daniels et al., 2005). In addition, some researchers claim that ecologic models that incorporate society-behavior-biology are most influential for modifying and promoting healthful behavior (Stovitz et al., 2008). However, biomedical interventions are generally focused on the individual. Inappropriate labeling of a child as overweight can be stigmatizing to the child and offensive to the parent (Story et al., 2002). The most effective interventions are family based and focus on modeling and reinforcement of health-promoting behaviors (Berk, 2008).

In response to the prevalence of overweight in youth, a majority of interventions have focused on the treatment of weight loss (Daniel et al., 2005), which may be culturally inappropriate for Latino families. Research observing maternal perceptions of child weight and body size demonstrates that Latina mothers do not correctly classify their overweight child as overweight (Sherry et al., 2004). In addition, Latina mothers perceive childhood overweight as being *saludable* or healthy (Diaz, Mainous, & Pope, 2007), unless it prohibits the child's physical activity (i.e., unable to play with other children) or emotional state (i.e., the child appears to be sad). Latinas also have a greater external locus of control and are more likely to believe that overweight is a genetic, physical attribute (Siebold, Knalf, & Grey, 2003). However, a family history of overweight associated with negative health outcomes like diabetes also influenced the mother's intent to change behavior (Crawford et al., 2004). Thus, because Latina mothers view weight differently than their White counterparts, it may be necessary to employ alternative strategies centered on overall health practices as opposed to weight loss.

3. **Limitations of acculturation measures and scales**

Even though the acculturative process has changed due to shifts in the geopolitical status of Latinos for which they do not feel the pressure to assimilate, the same measures continue to be predominantly used to determine degrees of acculturation and how these impact health. Typically used proxy measures for acculturation are language spoken or preferred, linguistic proficiency, and length of residency in the United States (Lara et al., 2005). Using language as an indicator of acculturation does not capture the heterogeneity of spoken language among Latinos in the United States. Namely, there are Latinos who prefer to primarily speak English, while others prefer Spanish and yet others are bilingual regardless of their place of birth or length of stay in the United States. In particular, language is not an adequate measure for Puerto Ricans because of bilingualism and biculturalism (Andersen et al., 2004), which is very important in capturing historical, societal, and other social dynamics often overlooked (Abraido-Lanza et al., 2006). In addition, Latinos that migrate to areas with high penetration of Latinos (e.g., New York, Miami, and communities of Chicago) have lower levels of acculturation than those who live in rural areas where few people speak Spanish or are of Latino origin. Thus, length of time in the United States is also commonly used as a proxy measure for acculturation, but among Puerto Ricans years of residence is not associated with language spoken or cultural orientation (Arcia et al., 2001).

Social class may be a better predictor of Puerto Rican cultural values than the number of years of residency (Arcia, Reyes-Blanes, & Montilla, 2000). The number of years living in the United States may also not be a good indicator of Latino health care access (Lara et al., 2005). Significant heterogeneity has also been found by length of stay for Latino health outcomes (Arcia et al., 2001). It has been purported that beyond the first two to three years of residence

after arriving to the United States, acculturation does not have an impact on Puerto Rican health as much as sociocultural identity (J. Arrom, personal communication, January 26, 2010). In addition, length of stay may not be the defining factor in a sense of membership and belonging (Arcia et al., 2001). However, the degree to which perceived discrimination from the Euro-Americans influences an increased desire of belonging to a Latino community or seeking social acceptance within a Latino community is poorly understood (Arcia et al., 2001). In addition, acculturation to other ethnic groups is generally ignored as White culture is revered as the standard of Americanness (Siatkowski, 2007; Abraido-Lanza, 2006). Furthermore, the acculturative process may differ for individuals encountering the social stigma of being different because of the color of their skin, language, or ethnicity; however, this is generally not included in acculturation studies (Padilla & Perez, 2003).

Socioeconomic status, lifestyle choices, and other characteristics (i.e., age and sex) have been found to be stronger indicators of Latino health outcomes than acculturation (Taningco, 2007). Although there is an assumption that acculturation accounts for the health paradox and differences in health outcomes among Latinos, there is evidence that socioeconomic factors and demographic characteristics may play a greater role (Taningco, 2007). The study by Taningco (2007) profiled Latinos with better health outcomes as being younger, having higher education, being married, having good income, doing regular exercise, and having a healthy diet.

Recognizing the limitations of proxy measures in reflecting the complexity of the acculturative process, some researchers have begun to utilize more comprehensive acculturation scales. Acculturation scales attempt to directly measure a person's level of immersion in a new culture in comparison to their native cultural values. However, studies observing Latino acculturation and health have been more centered on mental health issues and may not be

applicable to other health behaviors or outcomes. Nonetheless, there is a lack of models observing health behavior and outcomes (Abraido-Lanza et al., 2006; Lara et al., 2005). The acculturative barriers that Latinos encounter, in combination with their disadvantaged SES, have led to their characterization as a population at high risk of developing mental health problems. The concept itself has acquired operational significance in the development of services and interventions relevant to Latino mental health needs. In addition, it is important to interpret these findings with caution because the majority of the models used measure acculturation linearly, which forces Latinos to choose whether they are more Latino-dominant or American-dominant (Abraido-Lanza et al., 2006). Linear approaches assume that Latinos adopt American cultural values at the expense of their cultural heritage (Cortes, Rogler, & Malgady, 1994). This may pose a particular problem for Puerto Ricans who are more likely to be bicultural. Therefore, linear models provide limited understanding of the association to health behavior and outcomes (Abraido-Lanza et al., 2006). Consequently, Cortes, Rogler, & Malgady (1994) challenge the assumption of mutual cultural exclusivity in acculturative change, and propose using a bicultural model whereby each Latino subgroup is assessed independently.

Future research should use biculturality approaches at the least and multiculturality models at best in order to uncover variances in health behaviors and to develop appropriate, preventive health interventions. Evidently, there is a need for developing scales that account for unique sociocultural factors that may influence health behavior (Abraido-Lanza et al., 2005). Nonetheless, in order to be culturally responsive, these scales should be tailored to specific Latino subgroups (Abraido-Lanza et al., 2006) with community input due to geographic social environmental forces that may impact health behavior (Gimenez, 1997).

E.   **<u>Summary</u>**

As discussed in the review of the literature, the issue of childhood obesity is complex. Childhood overweight can result in adverse health consequences over time including early onset T2D and a host of other obesity-related health problems. There are numerous correlates that influence the development of childhood obesity, including maternal characteristics. In particular, understanding the role of parenting in the development of childhood overweight is critical given that childhood obesity has reached epidemic proportions. Research demonstrates that parental perceptions about weight, diet, and health influence child-feeding practices and child-eating response. In addition, maternal sociocultural factors may place children at an increased risk for becoming overweight and obese as early as the preschool years. Thus, it is important to assess the behavioral and sociocultural determinants that may be manifested in higher rates of overweight among Latino communities. Latino children in particular are at an elevated risk for overweight and related outcomes. However, research observing Latina maternal-feeding strategies is limited and the relationship between Latina child-feeding practices and child overweight is poorly understood. Among Latinos, Puerto Rican children may incur greater risks for developing obesity, but extant literature is lacking in explaining the relationship among Puerto Rican parenting, child-feeding strategies, and child weight status. Much of the literature that has observed the impact of Latino child feeding and obesity primarily includes small samples of individuals of Mexican origin or descent. Thus, this study focuses on the beliefs and behaviors of Puerto Rican mothers as contributors to the risk for childhood overweight and obesity development and/or prevention.

III. METHODS

This chapter provides a description of the study design and analysis plan. The following sections are included: research design, population and setting, eligibility criteria, sampling design, data collection, recruitment, survey development, measures of variables, analysis plan, and data management and entry.

A.   **Research Design**

This research study is a non-experimental, descriptive cross-sectional survey design to assess the maternal child-feeding practices associated with early childhood overweight in a Puerto Rican population of mothers with children two to five years of age residing in the HP community of Chicago, Illinois. This study serves as a pilot study to determine the appropriateness of the research instruments, study design, and data collection methods for Puerto Rican samples and to determine sample size, unanticipated findings, and consequences in planning for a full-scale study (Sproull, 2002).

The survey instrument evaluated participants at a single point in time and measured the relationship between maternal child-feeding strategies and child anthropometric indicators. The survey also captured the effects of child dietary intake on child anthropometric measures. The questionnaire responses were also used to determine the association between Puerto Rican cultural values and child anthropometric indicators. Additionally, confounding in these relationships was assessed using maternal BMI and WC as well as maternal and child characteristics. Findings from this observational survey design were employed to uncover the feeding perceptions, practices, and cultural values of Puerto Rican mothers that influence childhood obesity development and/or prevention.

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B.   **Population and Setting**

The target population consisted of Puerto Rican mothers with children two to five years of age who reside in the HP community of Chicago, Illinois. Participants were recruited from six early childhood centers in HP: (1) Centro Infantil Consuelo Lee Corretjer, (2) Casa Central Child Development Program, (3) Centro Nuestro Head Start, (4) Trinidad Lutheran Head Start, (5) Erie Neighborhood House Head Start, and (6) St. Sylvester School. The greater HP community has a significant Latino population, with 33% of community members being of Puerto Rican origin or descent. The residents are typically young families with more than 78% being under 44 years old and representing a significant number of women of childbearing age. The population exhibits several characteristics that exemplify the health disparities stated in the Healthy People 2020 report. Approximately 58% of the HP residents have incomes two times below the poverty level and 46% speak a language other than English at home (CDPH, 2006). Lack of access to health care, lack of exercise, obesity, and non-daily fruit and vegetable consumption are among the leading health indicators that place HP community members at average or high risk of developing heart disease, stroke, and diabetes (CDPH, 2006). Given the significant number of resource-poor Latinas in this community, surveying the child-feeding behavioral factors of Puerto Rican mothers will add to our understanding of obesity-related, health protective factors as well as risky behaviors that may aid in developing and/or tailoring existing obesity prevention strategies.

C.   **Eligibility Criteria**

This study administered a survey instrument and collected anthropometric measures from Puerto Rican mothers and their young children to assess the influence of maternal child-feeding strategies on child overweight development and prevention.

Enrollment of mothers was based on the following criteria:

- being of Puerto Rican descent (i.e., having at least one parent from Puerto Rican ancestry)

- being between age 18 and 44 (i.e., the predominant age of Puerto Rican women of childbearing age in HP)

- residing in HP

- having at least one child two to five years of age (referred to as the index child)

- having the index child enrolled at one of the six early childhood centers, and

- able to speak Spanish or English

Child eligibility was determined by:

- being two to five years of age (24–71 months)

- having a mother of Puerto Rican descent, and

- being the only child from the family recruited for participation

D.   **Sampling Design**

A purposive sample of 100 Puerto Rican mothers with at least one two- to five-year-old child attending one of the six participating early childhood centers located in HP was recruited. To maintain independence of assumptions for analysis, only one child per family was eligible to participate in the study. In cases where families had multiple children between ages two and five years of age meeting the eligibility criteria, one child was selected by using the next birthday method (Aday & Cornelius, 2006). This method involved the participating parent in identifying the child who was next to celebrate his or her birthday. In families with eligible twins, multiples, or children born within the same 12-month period, only the firstborn was chosen to participate.

E.   **Data Collection**

This study collected survey data on child characteristics from mothers. According to Samet and Alberg (1998), collecting information from the parents of young children is often the best alternative, particularly because parents, as the primary caregivers, are knowledgeable of their children's health status, their food, and physical environment, as well as socioeconomic and sociocultural conditions that may impact their child's health, especially among preschool aged children who are not yet influenced by peers.

Participating mothers were interviewed at the child's early childhood center in English or Spanish depending on the mother's preference. The average time to complete each survey was approximately 20 minutes. Following survey completion, weight, height, and WC were measured for the respondent mother and the index child. Quantifying the physical information took a maximum of 5 minutes to measure for the mother and the child. Survey data were collected by the principal investigator between May and December 2011. Upon completion,

parents received a $20 gift card as compensation for their time. The index children received a health-oriented book of approximately a $10 value available in Spanish, English, or a bilingual version based on participant preference. An 87% response rate was projected based on the Humboldt Park Community Health Survey (HPCHS) (Estarziau et al., 2006), and a comparable 84% response rate was achieved. Following data collection and analysis, participants will receive information on the results and will be invited to participate in the development of educational programming.

F.   **Recruitment**

The respondents in this feasibility study were recruited from the six HP early childhood centers for a one-time, in-person, interviewer administered survey. In recruiting parents and children, the primary investigator worked with staff from the participating preschools to determine how to tailor appropriate recruitment strategies for each program. The designated preschool staff members (e.g., administrators, parent coordinators, teachers, and school social workers) facilitated participant recruitment by forwarding mailings that included recruitment letters and flyers to parents soliciting their participation as well as including announcements in school bulletins or newsletters. Recruitment flyers in both Spanish and English were also visibly posted at the schools. (See Appendix A for a sample of recruitment materials). Flyers were also posted throughout the community, disseminated at community events, and distributed by supporting community-based organizations (CBOs) including the PRCC, Community Organizing for Obesity Prevention, the Greater Humboldt Park Community of Wellness, Association House, and the DEC. (See Appendix B for copies of the letters of support). In addition, the researcher also met with potential participants at monthly parent meetings for recruitment purposes. Recruitment efforts and participant enrollment were conducted

simultaneously between May and December 2011 on a rolling basis until the optimal sample size was reached.

Efforts focused on a goal of approximately 10 to 40 participants per participating early childhood center. The time needed to enroll subjects varied based on the size of the eligible student body at each school. The variation also depended on the level of assistance provided by the Head Start program staff. Some participants were exclusively recruited by the primary researcher. Other parents who met the eligibility criteria were referred to the researcher by school staff. All participants were screened, consented, and subsequently completed the study procedure on prescheduled enrollment dates. Participation dates were determined based on participant availability and coordinated with school staff and the primary investigator. Participation in the study was entirely voluntary, and written consent was obtained at the time of recruitment. Recruitment was continuous and participants were registered on a rolling basis until 100 eligible mother-child pairs completed the study protocol. To ensure participant enrollment, incentives were provided to study participants who enrolled and completed the study protocols.

1.   **Participant pathway**

The study population comprised of Puerto Rican mothers between the ages of 18 and 44 with children two to five years of age who reside in HP, Chicago. The sample population included individuals who met the eligibility criteria upon screening. All eligible recruits were invited to participate in the study and asked to complete a consent form prior to participation. Eligible women were considered enrolled upon signing the consent form for participation for themselves and their children. The participating children provided assent. The questionnaire was administered to consented mothers and anthropometric measures were subsequently collected

from these mothers and their index children. Thus, individuals who completed a written consent form, survey questionnaire, and anthropometric measures served as the study sample.

All attempts were made to collect complete data, although subjects had the opportunity to withdraw consent at any time. Participants with incomplete data were included in analyses to the extent that their data allowed. Comparisons were made between subjects with complete and incomplete data to determine if any issues existed in collecting similar information from this population. Recognizing that nonresponse bias cannot be completely accounted for by screening, staffing reviews, incentives, and increasing the number of individuals sampled, any non-ignorable missing data (e.g., item nonresponse and incorrect data) was imputed for data analyses using the substitution of the mean imputation method (Levy & Lemeshow, 1999). Otherwise, analyses were performed with the existing collected data. In addition, a short questionnaire was developed to determine reasons why participants may withdraw from participation at any time during the study; however, there was no participant withdrawal among respondents. (See Appendix C for a flow chart of the participant pathway).

2. **Informed consent and assent**

This pilot study collected survey data from mothers of children to gain a greater understanding of maternal protective health behaviors that may promote obesity prevention as well as risky behavior that may contribute to childhood obesity. Given that children require special attention in research as they are legally dependent on their parents (Friedman, Furberg, & DeMets, 1998), parents were used as a single-source method of child data collection to maximize the power to detect a significant difference of the effects (Holmbeck et al., 2002). In addition, there are ethical, informed consent, and confidentiality issues when collecting data directly from

minors which may be avoided by collecting data from the parent (Coyne, 1998). Thus, it is more beneficial for parents of minors under the age of 18 to provide consent for them. Therefore, parents provided consent for study participation for themselves and their child. Maternal eligibility for consent was 18 years of age or older.

In addition to survey data, anthropometric measures were collected from the participating mother and index child. Thus, mothers also consented to have weight, height, and WC measured for themselves and their children. The child's participation in the study was limited to the collection of their weight, height, and WC. According to federal regulations instituted by the Office of Protection for Research Risks in 1983 for child protection, investigators must obtain the child's assent even if the study poses minimal risks. This research involved no more than minimal risk to the participating child because only anthropometric data was collected, which are noninvasive processes. The information was collected at the child's school in the presence of the child's mother or school staff based on the mother's preference. In addition, the information was gathered in a private room to ensure confidentiality. A waiver for written child assent was approved by the Institutional Review Board because the participating children were between the ages of two and five years, and the risk was minimal. The Institutional Review Board considers children ages seven and older to be capable of providing assent for participation in research. Thus, permission for collecting anthropometric measures from the children was obtained through maternal consent. Nonetheless, if a child refused to have his or her measurements taken, this was considered as his or her dissent to participate.

3.   **Confidentiality**

The records of this study were kept strictly confidential. Research records were maintained in a locked file cabinet. All electronic information was coded and secured using a password protected file. Participant information was de-identified to ensure anonymity in all reports produced from the findings of this study.

G.   **Survey Development**

The purpose of the survey was to better understand the maternal child-feeding behaviors that may contribute to healthy child weight as well as those that may influence early childhood obesity development; and to generate ideas about how to best structure and implement future obesity prevention intervention programs tailored to low-income Puerto Rican populations. Cultural beliefs and socioeconomic and demographic factors can impact an individual's health behavior and consequently affect their health outcomes. Research demonstrates that parental behavior, such as restriction of snack foods (Fisher & Birch, 1999a, 1999b) may promote child overeating and obesity (Ventura & Birch, 2008). In addition, health-promoting behaviors (e.g., parental modeling of healthy dietary intake), have been reported to encourage healthy eating habits in children (Brown & Ogden, 2004), and subsequently may be associated with normal child weight outcomes (Kleges et al., 1995). However, there is limited research on parents' habits that support healthy child weight. Existing instruments developed to measure the child-feeding habits of parents have focused on deficit strategies of parental control (e.g., pressure to eat and restriction of selected foods) that have been associated with negative outcomes (i.e., child overeating and overweight) (Musher-Eizenman & Holub, 2007). Specifically, these tools failed to include indicators associated with fostering healthy eating such as parental modeling of

healthy behaviors, exposure to healthy foods, and educating the child about nutrition. Therefore, it is necessary to use comprehensive assessment tools in order to understand the practices that may increase the risk of childhood obesity as well as those that are protective and may counter the onset of childhood obesity and the related comorbidities that are detrimental to the health status of Puerto Ricans in HP. Musher-Eizenman and Holub (2007) developed the Comprehensive Feeding Practices Questionnaire (CFPQ), a survey instrument that is inclusive of both categories of child-feeding factors employed by mothers, those that may be health-promoting as well as those that may be health-compromising. The survey instrument appears in Appendix D.

1. **Comprehensive Feeding Practices Questionnaire**

This project employed the CFPQ (Musher-Eizenman & Holub, 2007) to assess maternal child-feeding practices that may impact childhood anthropometric indicators (i.e., height, weight, WC). The CFPQ is a 49-item validated instrument with twelve constructs that intends to capture parental feeding practices that contribute to both healthy and unhealthy child-eating behaviors and weight outcomes. The CFPQ combines constructs from two commonly used parent feeding practices instruments: the CFQ (Birch et al., 2002) and the Preschooler Feeding Questionnaire (PFQ) (Baughcum et al., 2000), to elicit a more comprehensive understanding of parent feeding behavior observing both CC and PC strategies. From the CFQ, the investigators retained items that measured monitoring, restriction, and pressure. From the PFQ, they included emotional states and control. The investigators also combined items measuring food as a reward from both the CFQ and the PFQ. Additional items were also included that have been associated with positive child outcomes including teaching the child about good nutrition, promoting a healthy food environment, modeling healthy eating behavior,

and encouraging healthy eating practices. In addition, the construct measuring parental restraint was included.

Six of the twelve subconstructs represent health-promoting CC behaviors, and six correspond to health-compromising PC behaviors. The subconstructs demonstrate moderate to high internal consistency coefficients (α= 0.58 to 0.81), which represents acceptable reliability. The CFPQ has adequate external validity and the subscales are independent of each other. The Spanish-version of the CFPQ is in the process of being validated. The instrument has a Flesch-Kincaid reading level of 6.4, which is indicative of a suitable reading level for parents across a wide range of educational attainment. The six subconstructs representing health-promoting behaviors include child control (α=0.69), encourage balance and variety (α=0.58), healthy environment (α=0.75), involvement (α=0.77), teaching about nutrition (α=0.68), and modeling (α=0.80). The health-compromising behaviors include emotional regulation (α =0.74), food as reward (α=0.69), monitoring (α=0.81), pressure to eat (α=0.79), restriction for weight control (α=0.70), and restriction for health (α=0.81).

The items were based on a 5-point Likert response scale ranging from "never" to "always" or from "disagree" to "agree" to rank participant perceptions, practices, and strategies. In addition, three of the 49 CFPQ items were worded negatively in order to discourage acquiescence across positively and negatively worded questions. These items were reverse coded so that the scores are consistent across all items as the coding and scoring guide suggests. Each of the constructs was scored independently and then summed across constructs for all respective items to arrive at a composite score. These composites were transformed into median values to ensure comparability across subconstructs, which rely on various numbers of items. For each subconstruct, higher scores represent greater agreement with the subconstruct (e.g., a higher

score on child control means that the child has more control over what he or she eats). Conversely, lower scores indicate disagreement with the subconstruct (e.g., a lower score on pressure means that the mother is less likely to employ strategies to coerce the child to eat). Additional information on the CFPQ constructs, scoring, and coding appears in Appendix E.

Although the CFPQ showed a correlation between the mothers' feeding strategies and child BMI, the study was predominantly validated with Caucasian samples in the United States (Musher-Eizenman & Holub, 2007). The representation of Latinos in this study was less than 2%. Literature demonstrates that culture influences the beliefs and strategies of mothers about child feeding and weight. Therefore, the present study seeks to understand the sociocultural impact of maternal-feeding practices on child eating and weight among the Puerto Rican Latino subgroup.

2.   **Dietary intake**

As previously noted, dietary intake affects the relationship between maternal child-feeding practices and child weight status. However, the CFPQ instrument does not account for the influence of dietary intake on child-feeding strategies. In order to more closely understand how this relationship may impact obesity among Puerto Rican children, this study used the California Health Interview Survey (CHIS) 2009 Child Questionnaire version 5.1 (2010), an instrument prepared for children from birth to eleven years old to be completed by an adult proxy respondent. The 7-item child dietary intake inventory in Section C of the instrument was used in order to estimate the child daily consumption of both healthy and unhealthy beverages, snacks, and meals. The questions are open-ended and allow the participants to report the total amount of food consumed based on recall of child dietary intake from the day or week

prior to participation. Specifically, mothers were asked to indicate the amount of 100% juice, sweetened beverages, fruit, vegetables, fried potatoes, sweet snacks, and fast food consumed by their child.

3.   **<u>Acculturation</u>**

Traditionally, acculturation scales measure adoption of the host culture linearly along a continuum that requires individuals to identify with American or Latino culture (Abraido-Lanza, Chao, & Florez, 2006; Lara et al., 2005). Recognizing that culture is dynamic and multidimensional, more recent scales incorporate biculturality and bidirectionality. However, these scales tend to focus exclusively on or have a significant proportion of items measuring language usage as an indicator of acculturation (Lara et al., 2005; Marin et al., 1987), which results in high levels of internal consistency while compromising content validity (Cortes, Rogler, & Malgady, 1994). Although language proficiency is central to acculturation, the process encompasses adaptation to values, interpersonal relationships, food preferences, and childrearing practices, among other sociocultural factors. In addition, most acculturation scales developed for use with Latino populations have been predominantly validated with Mexican samples. Latinos are not homogeneous and scales developed for one subgroup may not be generalizable across Latinos. Thus, the present study also assessed the impact of maternal acculturation on child-feeding practices using the BSPR (Cortes, Rogler, & Malgady, 1994).

The BSPR is a 20-item validated scale that captures involvement in both American and Puerto Rican cultural domains. Subscales showed high internal consistency ($\alpha= 0.73$ for the Puerto Rican domain to $\alpha=0.78$ for the American domain) indicating acceptable reliability. The BSPR has been validated in Spanish. The acculturation items were based on a 4-point Likert

response scale ranging from "not at all" (1) to "very much" (4). Acculturation is defined as "unacculturated," "American-dominant," "Puerto Rican-dominant," or "bicultural." The BSPR provided two scores of cultural dimension. Low scores in the Puerto Rican domain accompanied by high scores in the American domain represented high involvement in American culture or acculturation. High scores in both domains indicated immersion in both cultures or biculturality. High scores in the Puerto Rican domain coupled with low scores in the American domain reflected high involvement in Puerto Rican culture. Low scores in both domains represented being unacculturated to or low involvement in either culture. In addition, the mothers' length of residency in the United States was assessed as an indicator of acculturation that may influence the adoption of American cultural values and dietary norms. Length of residency was determined by the number of years the mother has lived in the United States.

4.   **<u>Anthropometric measures</u>**

Another measure that was not captured by the CFPQ study is an anthropometric measure of child nutritional status. Studies have attributed parental control practices to child overweight (Faith et al., 2004) although similar cross-cultural research has yielded mixed results (Faith et al., 2003; Galloway et al., 2006). However, these findings have not been observed in adequate samples of Latinos (Galloway et al., 2006), particularly a high-risk Latino subgroup like Puerto Ricans. In addition, although less is known about health-promoting behaviors and parent feeding practices, monitoring (Faith et al., 2004) and modeling (Brown & Ogden, 2004) behaviors have been observed as factors contributing to the adoption of healthy eating practices and healthy weight. Monitoring strategies have also been found to predict lower BMI scores in three-year olds (Faith et al., 2004). Latina mothers have identified positive parental modeling as influential for the adoption of healthful dietary behavior and physical activity by their children

(Crawford et al., 2004). Furthermore, a study by Musher-Eizenman and colleagues (2009) compared U.S. parents to French parents using the CFPQ, and the findings support a relationship between child BMI and maternal-feeding practices. Therefore, the weight and height measures were collected to determine the association between maternal-feeding practices and child BMI. In addition, maternal BMI and child BMI were compared to determine whether the mother's BMI is a good predictor of their child's BMI. Researchers have found a significant association between the mother's and child's BMI scores, but not between the father's and child's BMI (Musher-Eizenman et al., 2009).

Weight and height were collected from mothers and children in order to calculate BMI. For the purpose of this study, weight and height were measured continuously in order to better understand weight status among mothers and children of Puerto Rican heritage. The NHANES *Anthropometry Procedures Manual* (CDC, 2004) was adapted to determine the procedures for collecting weight and height. Measures were taken while the participants were fully clothed without shoes or excess clothing (e.g., jackets). Weight was collected in pounds using a calibrated SECA® 813 Digital Scale and converted to kilograms. Participants were asked to stand still in the center of the scale with their arms at the sides while facing forward. Height was measured in inches using a PRO-DOC® Stand-Alone Height Rod and converted to meters. In order to properly measure height, participants were asked to remove any hair accessories from the top of the head. Participants were asked to stand with both feet flat on the floor and the heels, buttocks, shoulder blades, and back of the head touching the vertical backboard. The head was aligned in the Frankfort horizontal plane (See Appendix F) (CDC, 2004). Participants were asked to place their heels together with the toes pointed slightly outward, and their arms and shoulders

relaxed with arms at the sides. The researcher placed the headboard firmly on top of the participant's head and then proceeded to take the height measurement.

Some investigators claim that WC is a better predictor of weight-related health risks for adult women (Lofgren et al., 2004) and children (Maffeis et al., 2000; Moreno et al., 2002). For example, a study of premenopausal women suggested that WC is a stronger predictor for coronary heart disease than BMI (Lofgrean et al., 2004). In addition, Jansenn, Katzmarzyk, and Ross (2004) used NHANES data to assess the predictive power of WC. The investigators found that WC is a stronger indicator of obesity-related co-morbidity than BMI. Similarly, Rexrode and colleagues (1998) found that WC was strongly associated with increased CVD risk among women with healthy BMI weight status (BMI ≤ 25). Among children, research on Italian youth ages three to eleven found WC to be a better predictor than BMI for CVD risk indicators, such as blood-lipids and hypertension (Maffeis et al., 2000). The investigators recommended using WC as a measure for children in clinical practice because of its utility and easily reproducible results. Children with a WC above the 90th percentile were considered to be at risk for CVD. In addition, a study by Moreno and colleagues (2002) compared BMI, WC, and skin folds in 140 children to determine the best indicator for metabolic syndrome risk. The researchers concluded that WC was the best screening measure for metabolic syndrome in children. Excess adiposity even in normal weight individuals can increase risk of obesity-related morbidity. Therefore, WC was also collected to assess anthropometry from the participating mothers and their children.

A SECA® Girth Measuring Tape was used to measure maternal and child WC to the nearest 0.1 centimeter. The NHANES *Anthropometry Procedures Manual* (CDC, 2004) was adapted to determine the level at which the abdominal or waist circumference is measured. First, the participant was asked to remove any excess clothing from around the waist. While the

participant was in a standing position, the investigator located the point where the highest lateral border of the right ilium and the midaxillary line of the body intersect. The measuring tape was aligned to this point and placed around the participant's torso holding the zero end below the measurement value. The measurement was taken with the stomach relaxed following the end of a normal expiration. (See Appendix G for a representation of the approximate measuring tape position for collecting WC) (CDC, 2004).

Nonetheless, BMI is an important measure of disease risk for women who are categorically obese (BMI> 35) (Klein et al., 2007). In addition, Jansenn, Katzmarzyk, and Ross (2004) found that the combination of BMI and WC explained a greater variance for disease risk indicators. However, these studies and the respective WC cut-off standards were based predominantly on White adult samples. More research is needed to determine the appropriateness of utilizing BMI and WC in Latino adult and child samples as indicators for anthropometric outcomes. Regardless of the risk a child may incur by being overweight, evidence suggests that Latina mothers are more likely to perceive that their overweight child is of normal weight or underweight (Contento, Basch, & Zybert, 2003; Reifsnider et al., 2006; Sherry et al., 2004).

5.   **Maternal social support with child feeding**

Mothers' child-feeding practices are also influenced by individuals in their social network. Mothers report that control over their children's dietary intake is challenged by other family members including grandparents, the child's father, or another adult figure (Jain et al., 2001). In particular, mothers find it difficult to reinforce healthful habits when these are countered by other family members. Among Latino families, Latina mothers are significantly

influenced by their elders' beliefs within a cultural context. There are intergenerational influences that override the mothers' intention to employ protective feeding strategies. A study by Reifsnider and colleagues (2006) found that low-income Latina mothers valued family, especially older women, as authority figures on infant and child-feeding practices when compared to trained health experts. Thus, the influence of culture and elders may diminish nutritional self-efficacy. According to Swinburn and colleagues (2004), a supportive home environment seems to have a protective effect against obesity. Nonetheless, there is little evidence to support the relationship between child social support with regard to feeding practices and child weight status, particularly among Latino subgroups. Therefore, the survey included questions to understand the influence of supportive feeding practices or mothers' partners in the home that may contribute to childhood obesity development or prevention in Puerto Rican families. The questionnaire collected information on the extent that other family members or adults assisted in feeding the index child, preparing meals, and monitoring the child's energy intake. Participants were asked to give binary "yes" or "no" responses.

6.   **Family composition**

To uncover the influence of household size on child weight status, questions regarding household composition were included in the survey. According to Sherry and colleagues (2004), older siblings influence child dietary behavior because they serve as role models to younger children during their critical development period. In particular, researchers have found that children's fat intake is positively associated with their siblings' fat intake (van der Horst et al., 2006). Similar findings have been found with regard to the influence of fathers' intake of fat as well as fruit and vegetable intake on their children (McCabe et al., 2007; van der Horst et al., 2006). This reflects the potential impact of fathers and other family members on

whether younger children consume healthy or unhealthy foods. Among Latinos, less acculturated males have been found to be influenced by their siblings' dietary intake while the dietary habits of more acculturated girls were more likely to be shaped by peers (Diaz et al., 2009). Latino boys have been found to have greatest risk for obesity (Gordon-Larsen, Adair, & Popkin, 2003). However, the literature indicates that regardless of the mothers' perceptions of their child's ability to regulate food intake, mothers did not enforce different levels of control over obese and non-obese siblings (Saleens, Ernst, & Epstein, 2000). Thus, there is limited information on the influence of siblings and other adults on Latino child health and obesity.

In addition, the number of family members may impact access to food availability in the household. The household size has been attributed as a risk factor for obesity, specifically among racial and ethnic groups that are more likely to have larger families (e.g., African American and Latinos) (Christakis & Fowler, 2007; Kaplan, Liverman, & Kraak, 2005). However, the literature is inconclusive with regard to whether household size is a good predictor of obesity. Some researchers indicate that household size is negatively associated with BMI and may in fact lower the risk for childhood overweight (Baker et al., 2010). In addition, Garasky and colleagues (2008) found that the size of a child's household is negatively related to the child's weight status. Furthermore, Crawford and researchers (2007) claim that family size does not contribute to current child weight, but rather the mother's history of childhood household size and food insecurity among low-income families are better predictors. Thus, information on family composition was collected to understand the dynamics of family size on the weight status of Puerto Rican children. Family composition was assessed based on the total number of household members as well as the total number of children under the age of 18. Questions regarding family composition were open-ended. Respondents reported on the total number of household members,

the number of children under the age of 18 years residing in the household, and the ages of each child.

7. **<u>Child health status</u>**

In order to understand the Puerto Rican mothers' perception of their child's health status, the survey also incorporated questions regarding the participants' beliefs of their child's overall health status as well as how they view their child's weight. Arcia (1998) observed the perceived child health of Mexican American and Puerto Rican parents with young children using HHANES data. Findings demonstrate that Mexican American and Puerto Rican parents are more likely to classify their children as having poor health. A cross-sectional study by Minkovitz and colleagues (2002) of nearly 10,000 mother-child pairs found an association between the mother's and child's health status.

This present study used the Quality of Life Short Form-12® (Ware, Kosinki, & Keller, 1996), general health status subdomain to measure respondent-assessed maternal and child health status defined by the sample participant as "excellent," "very good," "good," "fair," or "poor." Research also indicates that Latina mothers associate child underweight or thinness with poor health (Crawford et al., 2004). However, mothers of overweight children are hesitant to categorize them as overweight. Therefore, it is important to assess Puerto Rican mothers' perceptions of their child's weight status. Questions from the NHANES 2005–2006 Early Childhood Questionnaire (CDC, 2007b) for children from birth to fifteen years of age served as the standard for determining the child's weight status history. Some items were binary yes or no responses. In addition, questions from the CFPQ were used to assess maternal beliefs of child weight status rated as "overweight," "underweight," and "about the right weight."

8.   **Demographic characteristics**

Finally, this study also explored relationships between maternal-child characteristics and feeding practices in a cultural context. Extant research has correlated maternal demographic characteristics (i.e., marital status, parental education, and family income) to child-feeding strategies used by parents (Baughcum et al., 2000; Spruijit-Metz et al., 2002). However, results have been mixed and have narrowly explored relationships between parent characteristics and parental feeding practices. A recent study by Musher-Eizenman and colleagues (2009) used the CPFQ to assess the association between an array of feeding practices parents employ with their children and a wide range of parent and child characteristics. The researchers found a correlation between feeding practices and child BMI, but there was no significant relationship between parental demographic characteristics (i.e., income and education level) and child BMI. However, the 2009 CFPQ study was limited to Euro-American and French samples, which may not be generalizable to Puerto Ricans. Thus, the present study is intended to uncover the maternal characteristics that are culturally relevant to Puerto Rican samples.

H.   **Measures of Variables**

Based on the conceptual model discussed in Chapter 2, the relationship between the independent variable maternal child-feeding practices and the dependent variable child anthropometry was assessed. Moderating effects that may alter the relationship between the dependent and independent variables were also examined, including maternal social-cultural factors (e.g., acculturation), demographic characteristics (e.g., education level), and anthropometry. In addition, relationships were explored between the intervening variable of child dietary intake and child-feeding practices, child anthropometry, and acculturation.

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1. **Independent variables**

The primary independent variable assessed in this study was the child-feeding practices employed by mothers, which was measured by the CFPQ (Musher-Eizenman & Holub & 2007). The twelve CFPQ constructs were measured as continuous variables. The constructs included: child control, encourage balance and variety, healthy environment, involvement, teaching about nutrition, modeling, emotional regulation, food as reward, monitoring, pressure to eat, restriction for weight control, and restriction for health.

2. **Dependent variables**

The dependent variables being evaluated were child anthropometric indicators. Sex-specific BMI-for-age and WC served as the anthropometric measures. The child BMI calculations were made in SPSS based on weight and height measurements and converted into Z-scores to avoid issues with BMI percentiles scores with a limited upper range. Child WC-for-age was calculated in centimeters and then converted into percentiles using metrics from Fernandez and colleagues (2004) developed on Mexican American children. Child BMI and WC were assessed as continuous variables, and were also assessed as ordinal and nominal (categorical) variables for the purposes of reporting univariate and multivariate analyses, respectively.

3. **Moderating variables**

The moderating variables in this study included maternal anthropometric characteristics, SES, sociocultural factors, and child social support as well as perceptions of child health and weight status, and maternal report of physician-diagnosed illnesses. Maternal anthropometric indicators were assessed through the mothers' BMI and WC. Maternal BMI and WC scores were measured as continuous variables. Acculturation, child social support, and

family composition were analyzed as measures of maternal sociocultural status. Maternal acculturation was determined based on the BSPR (Cortes, Rogler, & Malgady, 1994). The BSPR acculturation domains were measured as continuous variables. In addition, the mothers' length of residency in the United States by number of years was measured as a continuous variable. Maternal social support questions regarding child care and feeding were categorized as nominal (categorical) variables. Family composition was assessed based on the number of household members measured continuously. The number of children under the age of 18 residing in the home was also analyzed as a continuous variable. Additionally, the primary caretaker of the index child and the main person in the household responsible for purchasing food were assessed as categorical household characteristics. The maternal demographic characteristics studied included maternal age, education level, annual household income, and marital status. Maternal age was measured as a continuous variable. Education level and income were measured as ordinal (categorical) variables. Marital status was measured as a nominal (categorical) variable. The health status of the index child was evaluated based on the mother's perception of the child's health and weight status as well as proxy-reported child health diagnosis, which were all measured categorically.

4.   **Intervening variables**

In addition, it is important to note that the child's eating behavior serves as an intervening variable between maternal child-feeding practices and child anthropometric indicators. Child dietary intake was measured as a continuous variable. Other variables that may also mediate the relationship between maternal-feeding strategies and child anthropometric indicators include genetic predisposition, physical activity, sedentary behavior, food access (i.e., at home or school), and family dietary intake; however, these variables were not measured in this

study. A summary of the variables being assessed along with their respective levels of

measurement appears in Table I.

TABLE I

SUMMARY LIST OF VARIABLES

Independent Variables	Measures
Health-promoting child-feeding practices 1. Child control 2. Encourage balance 3. Healthy environment 4. Involvement 5. Teaching about nutrition 6. Modeling	Continuous
Health-compromising child-feeding practices a. Emotional regulation b. Food as reward c. Monitoring d. Pressure to eat e. Restriction for weight control f. Restriction for health	Continuous
Dependent Variables	**Measures**
1. Child age and sex-specific BMI 2. Child age and sex-specific WC	Continuous
Moderating Variables	**Measures**
Maternal Sociocultural Status 1. BSPR domains 2. Years of U.S. residence 3. Social support with child feeding 4. Family composition 5. Primary care taker 6. Perceived health status	 Continuous Continuous Categorical (Nominal) Continuous Categorical (Nominal) Categorical (Ordinal)
Maternal Demographics 1. Education level 2. Annual household income 3. Marital status 4. Age	 Categorical (Ordinal) Categorical (Ordinal) Categorical (Nominal) Continuous
Maternal Anthropometry 1. Maternal BMI 2. Maternal WC	 Continuous Continuous
Intervening Variables	
Child Eating Behavior 1. Dietary intake	Continuous

I. **Analysis Plan**

Data analyses were performed using descriptive and inferential statistics. Basic descriptive statistics included frequency tables, percentages, medians, interquartile ranges (IQR), and minimum and maximum values. Frequency tables were used to assess nominal variables, including marital status and primary caretaker. The median and IQRs were used to assess ordinal variables including maternal education, income, social support, and perceived health status. Continuous variables included CFPQ constructs, acculturation, child and maternal anthropometrics, family composition, and maternal age. Although these are typically analyzed using means and standard deviations, median and IQRs were used as they are less influenced by extreme measures (Sproull, 2002). The significance level for this study was set to 0.05.

The outcome or dependent variable (child anthropometric indicators) and the independent variable (maternal child-feeding practices) were treated as continuous variables. Because of the small sample size, the outcome variable of child anthropometry was regrouped as a binary variable into the categories of overweight/obese or healthy. Thus, multiple logistic regression analyses were employed to determine whether maternal acculturation modifies the relationship between child anthropometric indicators and child-feeding practices. The model to be utilized will be $Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \ldots \beta_k X_k$ where Y is the dependent variable of child anthropometrics, X_1 represents the continuous variable of maternal child-feeding practices, and X_2 to X_k represent the covariates (e.g., maternal anthropometry, age, and acculturation). Data were analyzed using SPSS version 20 and SAS version 9.2.

J.   **Data Management and Entry**

The principal investigator served as the data quality control manager to maintain adequate data management and control. Every participant was assigned a unique identifier number to maintain anonymity. Open-ended questions were coded post-data collection based on the responses. To ensure data quality, the data manager reviewed participant documentation for accuracy and completeness of forms, procedures, and data collected. The manager followed up with participants as necessary on missing data items, inconsistent information, or submission of appropriate documentation. This guaranteed data quality monitoring and allowed for corrective action to be taken throughout the study.

The data quality manager was also responsible for developing the database, reconciling data entries, and cleaning of all study data. For accuracy of data entry, the data manager conducted data entry validation by reviewing 20% of the dataset and reconciling discrepancies. The effect of nonresponse and missing data, incorrect data, and excess variability were reconciled. Data were stored in a secured office and all electronic data files were maintained on a computer with a secured password. All data files were be backed up electronically and stored at an alternate and secured study location.

IV. RESULTS

The purpose of this chapter was to describe the role of maternal child-feeding practices in the relationship between child anthropometric measures and maternal acculturation. This chapter consists of five main sections—sample characteristics, maternal child-feeding practices, child-feeding characteristics, anthropometric measures, and acculturation. The results are based on 100 mother-child pairs. In addition, bivariate analyses were conducted to understand the relationships among maternal child-feeding practices, child dietary behavior, anthropometric measures, and acculturation. Bivariate analyses examine the following relationships: (1) child-feeding practices and child anthropometric values, (2) child-feeding practices and child-feeding characteristics, (3) child-feeding practices and maternal and child characteristics, (4) child anthropometric measures and child-feeding characteristics, (5) child and maternal anthropometric measures, (6) child anthropometric measures and maternal and child characteristics, (7) acculturation and child-feeding practices, (8) acculturation and child dietary intake, and (9) acculturation and child anthropometric measures. Next, the results of the multivariate logistic regression analyses involving maternal child-feeding practices, dietary intake, sociocultural factors, and child anthropometry are described with main effects and interaction effects models. A final section presents a summary of the study results.

A.   <u>Summary of Population, Recruitment, and Setting</u>

The sample included 100 mothers residing in the HP community of Chicago who identified as Puerto Rican and had at least one child two to five years of age attending one of the six participating early childhood centers. There were a total of 184 participants recruited and screened for participation, of which 84 were not enrolled in the study. Of the individuals not

118

enrolled, 65 women screened were not eligible for participation. Some of the prospective

participants were ineligible because they were currently pregnant or breastfeeding. Several

potential respondents were also ineligible because either the mother or the child did not meet the

age eligibility criteria. Other women recruited were not eligible because they did not identify

their nationality as Puerto Rican. There also were 19 individuals eligible who elected not to

participate. Thus, this study yielded a participant response rate of 84%, which was comparable to

the projected rate based on the HPCHS rate of 87%. Some eligible persons recruited were not

enrolled because the researcher was unable to reach the individual either in person or by phone to

schedule a time for participation or the prospective participant moved. Other individuals who

were not reached by phone had a disconnected number, provided a wrong number, or did not

return calls. In addition, some persons declined participation because they indicated that they had

difficulty participating due to their work schedule and/or family commitments, which did not

allow for sufficient time to complete the survey. Of the 100 Puerto Rican women who

participated, most completed the survey and other study forms in English (n=89) in comparison

to those who completed the forms in Spanish (n=11). Table II represents the distribution of study

participants for each of the recruitment sites. Most of the mother-child pairs were recruited from

the Casa Central Head Start Program (n=31) followed by Trinidad Lutheran (n=20), Centro

Infantil (n=17), Erie House (n=12), Centro Nuestro (n=10), and St. Sylvester (n=10).

TABLE II

DISTRIBUTION OF STUDY PARTICIPANTS BY RECRUITMENT AREAS

Early Childhood Center	Number of Participants (percent)
Casa Central Head Start	31 (31.0%)
Trinidad Lutheran Head Start	20 (20.0%)
Centro Infantil Head Start	17 (17.0%)
Erie House Head Start	12 (12.0%)
Centro Nuestro Head Start	10 (10.0%)
St. Sylvester Pre-School	10 (10.0%)

B.   **Summary of Participant Demographic Characteristics**

The median age of the mothers was 29.0 years (IQR: 24.0–34.0). The majority of the women were single (67% single, single never been married, a member of an unmarried couple, separated, widowed, or divorced), highly educated (67% some college, associate's, bachelor's, or master's degrees), and employed (70%). Many of the women employed worked in educational, health, and social service professions (28%), management or administrative positions (21%), and sales and service related occupations (21%). The remainder of the participants (30%) reported being unemployed. Most of the participants reported being the head of the household (73%), earning an annual income of less than $20,000 (33%) or $20,000–$39,000 (38%) for a median household size of 4.0 individuals (IQR: 3.0–5.0). Table III provides descriptive information on the respondents.

TABLE III

MATERNAL SAMPLE CHARACTERISTICS

Age in Years (Median, IQR)	29 (24.0–34.0)
Marital Status (n; percent)	
Married	32 (32.0%)
Single	67 (67.0%)
Refused	1 (1.0%)
Level of Education (n; percent)	
High School or Less	33 (33.0%)
Some College or College Degree/s	67 (67.0%)
Occupational Status (n; percent)	
Educational, Health, and Social Service	28 (28.0%)
Managerial/Administrative	21 (21.0%)
Sales and Service Related	21 (21.0%)
Unemployed	30 (30.0%)
Head of Household (n; percent)	
Self	73 (73.0%)
Husband	13 (13.0%)
Other	12 (12.0%)
Self and Spouse	2 (2.0%)
Annual Income (n; percent)	
Less than $20,000	33 (33.0%)
$20,000–$39,000	38 (38.0%)
$40,000 and above	23 (23.0%)
Don't Know	6 (6.0%)
Household Size (Median, IQR)	4.0 (3.0–5.0)
Number of children (Median, IQR)	2.0 (1.0–3.0)

The sample also included 100 children two to five years of age. The median child age was 4.0 years (IQR: 3.0–4.0). The sample consisted of 45 boys and 55 girls. A majority of the children had at least one sibling (62%), some children had no siblings (38.0%) while others had 2 or more siblings (29.0%). Approximately half of the boys and girls (48.0%) in the study had at least one older sibling. Table IV provides a summary of child sample characteristics.

TABLE IV

CHILD SAMPLE CHARACTERISTICS

Child's Sex	Number of Participants (percent)
Male	45 (45.0%)
Female	55 (55.0%)
Child Age	
2 years	9 (9.0%)
3 years	39 (39.0%)
4 years	40 (40.0%)
5 years	12 (12.0%)
Number of Siblings	
No Siblings	38 (38.0%)
One Sibling	62 (62.0%)
Two or More	29 (29.0%)
Number of Older Siblings	
None	52 (52.0%)
One Sibling	29 (29.0%)
Two or More	19 (19.0%)

C.   **Maternal Child-feeding Practices**

The CFPQ instrument was used to capture twelve child-feeding domains. All items corresponding to each domain were measured on a 5-point Likert scale. Six of the domains are defined as health-promoting (child control, encourage balance and variety, involve in meal planning and preparation, model healthy eating, healthy environment, teach about nutrition) and six as health-compromising (monitor unhealthy foods, emotional regulation, food as reward, pressure to eat, restriction for health, restriction for weight control). A subscore for each domain was calculated by summing across the items, or reverse-coded items, so that higher scores reflect stronger agreement with the domain trait. Table V depicts a summary of the CFPQ domains, the number of items, the median values, and the observed Cronbach's alpha for each subscore. The participating mothers were more likely to report employing health-promoting feeding practices in comparison to health-compromising strategies. In particular, the mothers strongly agreed that they encourage dietary balance and variety to promote healthy food choices (median=20.0; IQR: 19.0–20.0), model healthy eating practices (median=20.0; IQR: 17.0–20.0), agreed that they involve their children in meal planning and preparation (median=13.0; IQR: 10.0–15.0), promote a healthy environment (median=17.0; IQR: 14.25–18.0), and teach their children about nutrition (median=13.0; IQR: 11.0–15.0). However, the mothers were less likely to employ strategies that support the child in exercising his or her control over food intake (median=13.0; IQR: 10.0–16.0). Among the child compromising approaches practiced by the respondents, the mothers slightly agreed to monitoring the consumption of unhealthy foods (median=16.0; IQR: 14.0–18.0), pressuring their children to eat (median=13.0; IQR: 9.25–17.0), or restricting the consumption of unhealthy foods (median=16.0; IQR: 13.25–19.0). The participants were less likely to report practicing strategies that promote food as a reward (median=8.0; IQR: 5.0–

11.75), regulating their children's emotional state (median=3.0; IQR: 3.0–5.0), or restricting foods for the purpose of weight control (median=14.0; IQR: 11.0–19.0). The Cronbach's alpha reliability of the 49-item scale of child-feeding practices (after reverse-scoring the appropriate items) was 0.71. Cronbach's alpha calculations indicate that there was strong reliability for the items included in the constructs that measure modeling (α=0.73), monitoring (α=0.73), reward (α=0.71), pressure (α=0.75), and restriction for weight (α=0.82), as well as for involvement (α=0.63), balance (α=0.60), and emotional regulation (α=0.60). However, calculations showed low reliability among items measuring child control (α=0.36), environment (α= 0.53), and teaching about nutrition (α=0.38) may not be reliable.

TABLE V

SUMMARY OF MATERNAL-FEEDING CHARACTERISTICS

CFPQ Domains—Health-promoting (Number of items)	Median (IQR)	Cronbach's α
Child Control (5)	13.0 (10.0–16.0)	0.357
Encourage Balance and Variety (4)	20.0 (19.0–20.0)	0.599
Involve Meal Planning and Preparation (3)	13.0 (10.0–15.0)	0.629
Model Healthy Eating (4)	20.0 (17.0–20.0)	0.732
Healthy Environment (4)	17.0 (14.25–18.0)	0.531
Teach About Nutrition (3)	13.0 (11.0–15.0)	0.376
CFPQ Domains—Health-compromising (Number of items)	Median (IQR)	Cronbach's α
Monitor Unhealthy Foods (4)	16.0 (14.0–18.0)	0.730
Emotional Regulation (3)	3.0 (3.0–5.0)	0.597
Food as Reward (3)	8.0 (5.0–11.75)	0.732
Pressure to Eat (4)	13.0 (9.25–17.0)	0.746
Restrict for Health (4)	16.0 (13.25–19.0)	0.599
Restrict for Weight (7)	14.0 (11.0–19.0)	0.823

D.   **Child-feeding Characteristics**

Other feeding characteristics observed in this study included family meal structure, child dietary intake, and family support with feeding and monitoring child meals. Most of the women in the study identified themselves as the primary caretaker for their child participant (90%) and received assistance from other family members—primarily a grandparent (37%) followed by the child's father (28%). Older siblings also played a role in providing assistance with feeding the younger child respondents (8%). Most of the mothers received support at home with child feeding (72%), preparation of child meals (70%), and assistance with monitoring child dietary intake (73%). Most women were the primary food shopper for the household (73%). The majority of the respondents reported eating meals together (94%) with most sharing at least one daily meal as a family (46% one meal daily and 47% two or more meals daily). A summary of the child-feeding characteristics appears below in Table VI.

TABLE VI

SUMMARY OF CHILD-FEEDING CHARACTERISTICS

Primary Caretaker	Number (percent)
Mother	90 (90.0%)
Grandparent	6 (6.0%)
Father	2 (2.0%)
Both parents	2 (2.0%)
Other Caretaker	**Number (percent)**
Grandparent	37 (37.0%)
Child's father	28 (28.0%)
Older sibling	8 (8.0%)
Other	6 (6.0%)
None	21 (21.0%)
Child-feeding Support	**Number (percent)**
Feeding child	72 (72.0%)
Meal preparation	70 (70.0%)
Monitoring meals	73 (73.0%)
Primary Food Shopper	**Number (percent)**
Mother	73 (73.0%)
Mother and Other Family Member	23 (23.0%)
Other	4 (4.0%)
Family Meal Structure	**Number (percent)**
Yes	94 (94.0%)
No	6 (6.0%)
Number of Daily Family Meals	**Number (percent)**
None	7 (7.0%)
One Meal	46 (46.0%)
Two or more Meals	47 (47.0%)

The mothers in the study also reported the child's daily dietary intake of foods that promote healthy and unhealthy eating habits. The median child consumption of 100% juice was 2.0 cups daily (IQR: 1.0–2.0). The median fruit and vegetable intake was 1.75 (IQR: 1.0–2.0) and 1.0 (IQR: 0.25–1.0) servings, respectively. The median daily consumption of sweets was 1.0 serving (IQR: 0–1.0). The weekly median intake of fast foods was 1.0 meal per week (IQR: 1.0–2.0). The mothers reported little to no consumption of fried potatoes (IQR: 0–0) and sweetened beverages (0; IQR: 0–0.38). Most of the mothers reported their children consumed 1.0–2.0 cups of 100% juice daily (56%). Interestingly, 21% of the children did not consume any fruit juice at all and another 23% consumed more than 2.0 cups of juice daily. Most of the children were also reported to eat 1.0–2.0 servings of fruits (69%) and 13% had no consumption at all. Similarly, 67% of the children consumed 1.0–2.0 servings of vegetables daily with another 25% reporting no intake. Most of the mothers indicated that they completely restricted their children from any daily intake of sweetened beverages including soda (75%). The majority of the mothers also limited their children's daily consumption of sweets to 1.0–2.0 servings (65%) while some did not report any intake (32%). Although most of the respondents reported no consumption of fried potatoes (83%) the prior day, most of the parents did claim their children eating fast food at least 1.0–2.0 times per week (64%). Nonetheless, 23% reported no consumption of fast food meals in the past week. Table VII summarizes maternal report of child dietary intake.

TABLE VII

SUMMARY OF CHILD DIETARY INTAKE

Daily Dietary Intake	Median (IQR)
100% Juice	2 cups (1.0–2.0)
Fruit	1.75 servings (1.0–2.0)
Vegetable	1 serving (0.25–1.0)
Sweets	1 serving (0–1.0)
Fried Potatoes	0 servings (0–0)
Sweetened Beverages	0 servings (0–0.38)
Weekly Fast Food Intake	1 meal (1.0–2.0)
Daily Consumption	Number (percent)
100% Juice	
None	21 (21.0%)
1–2 cups	56 (56.0%)
More than 2 cups	23 (23.0%)
Fruits	
None	13 (13.0%)
1–2 servings	69 (69.0%)
More than 2 servings	18 (18.0%)
Vegetables	
None	25 (25.0%)
1–2 servings	67 (67.0%)
More than 2 servings	8 (8.0%)
Sweetened Beverages	
None	75 (75.0%)
1–2 cups	25 (25.0%)
Sweets	
None	32 (32.0%)
1–2 servings	65 (65.0%)
More than 2 servings	3 (3.0%)
Fried Potatoes	
None	83 (83.0%)
1 serving	17 (17.0%)
Weekly Fast Food Consumption	
None	23 (23.0%)
1–2 servings	64 (64.0%)
More than 2 servings	13 (13.0%)

E.   **Anthropometric Measures**

Tables VIII–IX display an overview of maternal and child anthropometric measures for the participating 100 mother-child pairs. Maternal and child BMI were calculated in SPSS v. 20 using the Metric BMI Formula of weight in kilograms divided by height in meters squared (kg/m^2). The median BMI for the 100 mothers was 27.53 kg/m^2 (24.45–33.04). The mothers' median WC was 91.44 cm (83.82–103.66). A summary of maternal BMI and WC median values appears in Table VIII. In addition, Table VIII provides a review of maternal weight status by categories using the CDC standards for BMI and WC. The findings revealed that an alarming 71% of the participating women were overweight or obese based on BMI. One in four women had a healthy BMI. Similarly, 62% of the women were at risk of overweight or obesity based on WC (≥88 cm). Only one in five women had a healthy WC value (<88 cm).

For the corresponding 100 children in this sample, BMI percentiles were calculated using a modified LMS method as presented in the age and sex-specific 2000 CDC BMI percentile curves because BMI and WC vary by age and sex, especially among children (Kuczmarski et al., 2000). The median BMI percentile for all children was 69% (IQR: 60%–87%). Among girls, the median BMI was 74% (65%–90%), and among boys, 63% (IQR: 34%–78%). Child WC percentiles were calculated using Fernandez and colleagues (2004), and using the Mexican American age- and sex-specific cut-off points, but categorized as less than 10%, 10%–25%, 25%–50%, 50%–75%, 75%–90%, and greater than 90%. Only 2.0 children in the sample had WC percentiles less than 25%, 13.0 were between 25%–50%, 28.0 between 50%–75%, 35.0 between 75%–90%, and 22.0 above the 90%. Table IX depicts the child age- and sex-specific BMI and WC percentiles.

TABLE VIII

MATERNAL ANTHROPOMETRIC VALUES

Anthropometric Values	Median (IQR)
Maternal BMI (kg/m^2)	27.53 kg/m^2 (24.45–33.04)
Maternal WC (cm)	91.44 cm (83.82–103.66)

Maternal BMI Category	Number (percent)
Underweight (<18.5)	4 (4.0%)
Healthy weight (18.5–24.9)	25 (25.0%)
Overweight (25.0–29.9)	29 (29.0%)
Obese (≥30)	42 (42.0%)

Maternal WC Category	Number (percent)
Healthy (<88 cm)	38 (38.0%)
Overweight/Obesity risk (≥88cm)	62 (62.0%)

TABLE IX

AGE AND SEX-SPECIFIC BODY MASS INDEX AND WAIST CIRCUMFERENCE PERCENTILES

Anthropometric Measures	Boys (n=45)	Girls (n=55)
BMI Percentiles, median (IQR)	62.6 (34.5–78.4)	74.4 (64.7–89.7)
BMI Category	Number (percent)	Number (percent)
Underweight (<5%)	1 (2.0%)	0 (0%)
Healthy (5%–<85%)	34 (76.0%)	37 (67.0%)
Overweight (85%–<95%)	6 (13.0%)	8 (15.0%)
Obese (≥95%)	4 (9.0%)	10 (18.0%)
Waist Circumference	Number (percent)	Number (percent)
<25%	0 (0%)	1 (2.0%)
25%–50%	8 (18.0%)	5 (9.0%)
50%–75%	14 (31.0%)	15 (27.0%)
75%–90%	15 (33.0%)	20 (36.0%)
>90%	8 (18.0%)	14 (26.0%)

F.   **Acculturation**

Maternal acculturation was observed using the BSPR (Cortes, Rogler, & Malgady, 1994). Typically, lower scores for subscores for each domain of Puerto Rican and American cultural dominance indicate dominant traits; however, for consistency among scales for this study, items were reverse coded so that higher scores indicated stronger cultural preference. The sum of scores for each subscale ranges from 10–45. Individuals scoring high on both scales at or above 27.50 were characterized as bicultural. The Cronbach's alpha reliability of the 20-item BSPR scale (after reverse-scoring the appropriate items) was 0.62. Items included in measuring Puerto Rican dominance had strong reliability (α=0.80). Items included in American dominance also showed high reliability (α=0.76). The median score for Puerto Rican dominance was 36.00 (33.00–39.00) and the median score for American dominance was 32.25 (28.13–35.00). Of the 100 participating mothers, the majority of the respondents scored high on both cultures indicating that the women were more likely to be bicultural (70%). Another 22% of the respondents scored highly on the Puerto Rican cultural domain alone in comparison to 8% who only scored highly on the American cultural domain. Most of the participants were also U.S.-born (83%) with a median number of 26.50 years (21.00–32.00) living in the United States. Puerto Rican natives represented 16% of the sample and one respondent was born in Germany. The median number of years of residence outside of the continental United States was 0 years (0–2.0). Thus, the majority of the women were first-generation U.S.-born with foreign-born parents or migrants with of foreign-born parents with at least one parent of Puerto Rican heritage (66%). Many of the first-generation participants also reported having both foreign-born parents of Puerto Rican lineage (52%). Second-generation participants were defined as U.S.-born women with at least one U.S.-born parent (34%). Nearly half of the second-generation participants had

both parents born in the United States (15%). Most of the women (89%) reported being bilingual. The majority of the women indicated English as their preferred language for completing the survey interview (90%). Table X summarizes the median and IQR and Cronbach's alpha for the Puerto Rican and American cultural domains as well as the values for each of the acculturation measures.

TABLE X

SUMMARY OF ACCULTURATION VALUES

Cultural Domain	Median (IQR)	Cronbach's α
Puerto Rican Dominance	36.00 (33.00–39.00)	0.763
American Dominance	32.25 (28.13–35.00)	0.800
Acculturation Status	Number (percent)	
Bicultural	70 (70.0%)	
Puerto Rican-dominant	22 (22.0%)	
American-dominant	8 (8.0%)	
Unacculturated	0 (0%)	
Place of Birth	Number (percent)	
Puerto Rican Native	16 (16.0%)	
U.S.-Born	83 (83.0%)	
Other	1 (1.0%)	
Residence	Median years (IQR)	
Puerto Rico/Other	0 (0–2.0)	
United States	26.50 (21.00–32.00)	
Generational Status	Number (percent)	
First-generation	66 (66.0%)	
Second-generation	34 (34.0%)	
Puerto Rican Lineage	Number (percent)	
First-generation	52 (52.0%)	
Second-generation	15 (15.0%)	
Bilingual	Number (percent)	
Yes	89 (89.0%)	
No	11 (11.0%)	
Language Preference	Number (percent)	
English	90 (90.0%)	
Spanish	10 (10.0%)	

G.   **Bivariate Analyses**

1.   **Child-feeding practices**

This section will examine relationships between the child-feeding practices of Puerto Rican mothers in the HP community of Chicago, Illinois using bivariate analyses. The analyses described in this section were conducted to explore **Specific Aim 1**: to determine the association between maternal child-feeding practices and: (a) child anthropometric indicators, (b) child-feeding characteristics (e.g., child dietary intake), and (c) maternal and child characteristics.

a.   **Child-feeding practices and child anthropometric values**

A two-tailed Spearman rho correlation test was used to determine the association between maternal child-feeding practices and child age- and sex-specific anthropometric values. Table XI represents the correlations coefficients between the CFPQ child-feeding domains and child BMI and WC. Child WC was positively correlated with the health-promoting CFPQ domain of child control of eating behaviors (r=0.27, p=0.007). Child BMI and WC were negatively correlated with maternal pressure to eat (r=-0.28, p=0.004; r=-0.23; p=0.023), one of the health-compromising CFPQ indicators. Significant correlations are represented below in Figures 3–5. There was no significant relationship between the other CFPQ scores and child BMI or WC.

TABLE XI

CORRELATIONS BETWEEN MATERNAL-FEEDING PRACTICES AND ANTHROPOMETRIC VALUES

CFPQ Domains	Child Anthropometric Values			
	BMI percentile		WC percentile	
	Spearman rho (r)	p-value	Spearman rho (r)	p-value
Child Control	r=0.14	p=0.18	r=0.27**	p=0.00
Balance and Variety	r=0.03	p=0.77	r=0.03	p=0.76
Involvement	r=-0.09	p=0.36	r=-0.04	p=0.71
Modeling	r=-0.05	p=0.65	r=0.02	p=0.87
Healthy Environment	r=-0.09	p=0.39	r=-0.06	p=0.57
Teach Nutrition	r=0.07	p=0.49	r=0.09	p=0.37
Monitoring	r=0.19	p=0.06	r=0.16	p=0.12
Emotional Regulation	r=0.14	p=0.17	r=0.15	p=0.13
Food Reward	r=0.00	p=0.97	r=-0.09	p=0.36
Pressure	r=-0.28**	p=0.00	r=-0.23*	p=0.02
Restriction Health	r=0.12	p=0.24	r=0.09	p=0.36
Restriction Weight	r=0.19	p=0.06	r=0.17	p=0.10

* $p<0.05$

** $p<0.01$
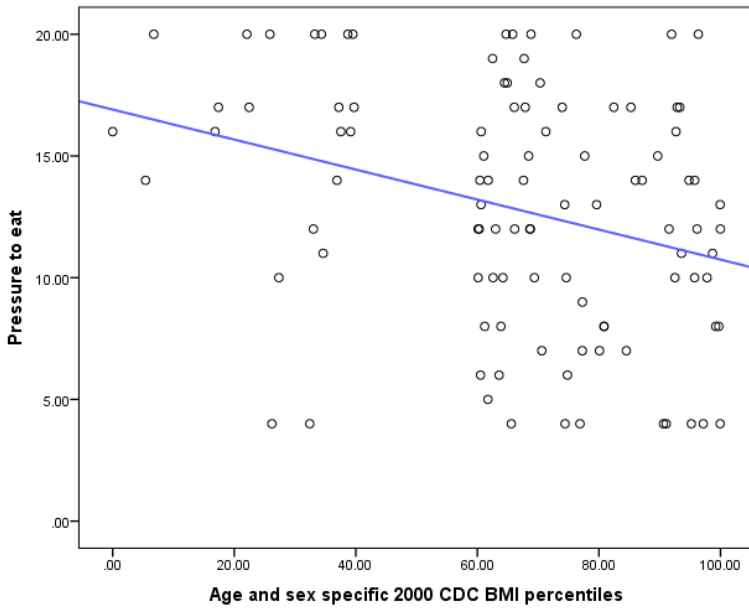
Figure 3. Negative correlation between child body mass index and maternal pressure to eat.
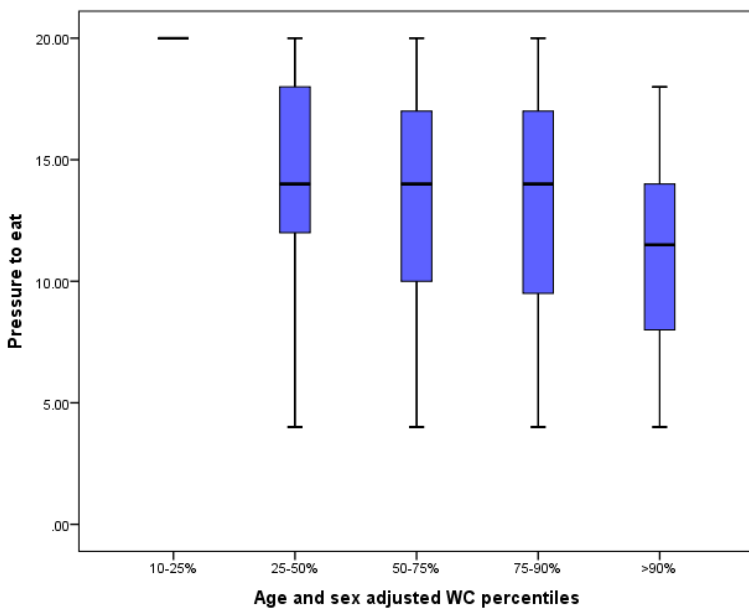
Figure 4. Negative correlation between child waist circumference and maternal pressure to eat.
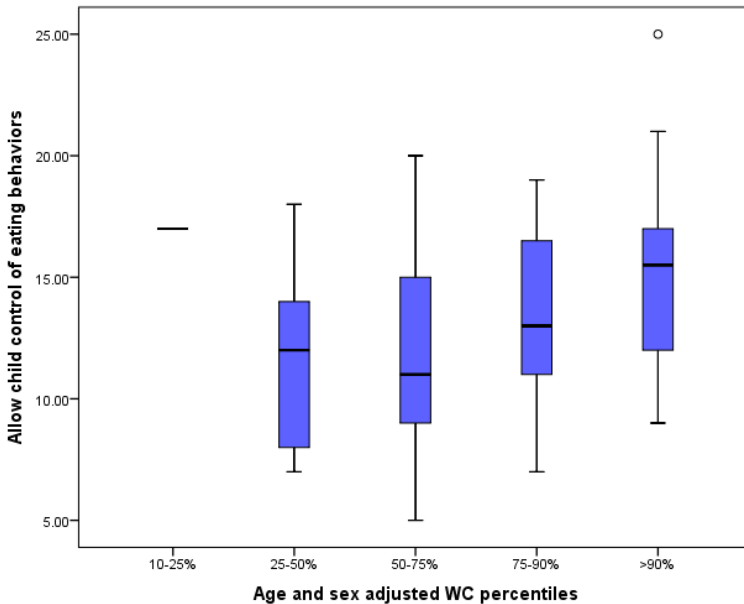
Figure 5. Positive correlation between child waist circumference and child control of dietary intake.

b.   **Child-feeding practices and child-feeding characteristics**

The Mann Whitney U test of associations was used to determine the relationship between the CFPQ domains and household child-feeding characteristics. A summary of these associations appears in Table XII. Mothers who received assistance with child feeding were more likely to report teaching their child about nutrition ($p=0.029$) and using food to regulate their child's emotions ($p=0.009$). In addition, the Spearman rho correlations test determined a significant positive correlation between the frequency of family meals consumed and maternal encouragement of a well-balanced diet ($r=0.20$, $p=0.044$) as well as the teaching children about nutrition ($r=0.25$, $p=0.013$). Significant relationships are displayed in Figures 6–10 below.

TABLE XII

ASSOCIATIONS BETWEEN CHILD-FEEDING DOMAINS AND CHILD-FEEDING CHARACTERISTICS

CFPQ Domains	Assist Feeding			Assist Meal Preparation			Assist Meal Monitoring			Number of Family Meals (n=100)
	yes=72 Median (IQR)	no=28	p-value	yes=70, Median (IQR)	no=30	p-value	yes=73 Median (IQR)	no=27	p-value	
Test	Mann Whitney U			Mann Whitney U			Mann Whitney U			Spearman rho (r), p-value
Control	13(10,16)	12(10,17)	p=0.98	13(10,16)	12(11,16)	p=0.73	13(10,16)	12(11,17)	p=0.95	r=-0.19, p=0.06
Balance	20(19,20)	20(19,20)	p=0.77	20(19,20)	20(19,20)	p=0.27	20(19,20)	20(19,20)	p=0.51	r=0.20*, p=0.04
Involve	13(9,15)	13(10,15)	p=0.61	13(9,15)	13(10,15)	p=1.00	13(9,15)	13(10,15)	p=0.97	r=0.08, p=0.43
Model	20(17,20)	19(17,20)	p=0.74	20(17,20)	20(17,20)	p=0.89	20(17,20)	19(16,20)	p=0.61	r=0.09, p=0.40
Environment	17(14,18)	17(14,18)	p=0.95	17(15,18)	17(14,18)	p=0.53	17(15,19)	17(14,18)	p=0.58	r=0.16, p=0.12
Teach	13(11,15)	15(13,15)	p=0.03*	13(11,15)	15(12,15)	p=0.07	13(11,15)	15(12,15)	p=0.14	r=0.25**, p=0.01
Monitor	16(14,18)	16(13,19)	p=0.81	16(14,18)	17(13,19)	p=0.53	16(14,18)	16(13,19)	p=0.99	r=0.19, p=0.06
Regulation	4(3,6)	3(3,4)	p=0.01**	3(3,5)	3(3,5)	p=0.15	3(3,6)	3(3,5)	p=0.10	r=-0.00, p=0.98
Reward	9(6,12)	7(3,11)	p=0.10	9(6,12)	7(3,11)	p=0.10	9(6,12)	7(3,11)	p=0.15	r=-0.13, p=0.21
Pressure	12(10,17)	14(6,17)	p=0.75	13(10,16)	15(8,19)	p=0.43	13(10,17)	14(8,17)	p=0.57	r=-0.04, p=0.71
Restrict for Health	17(14,19)	16(12,18)	p=0.09	17(14,19)	16(12,19)	p=0.29	16(14,19)	16(13,19)	p=0.55	r=-0.1, p=0.35
Restrict for Weight	15(11,19)	12(9,21)	p=0.33	15(11,19)	12(9,18)	p=0.18	15(11,19)	11(9,19)	p=0.26	r=-0.05, p=0.63

*p<0.05
**p<0.01
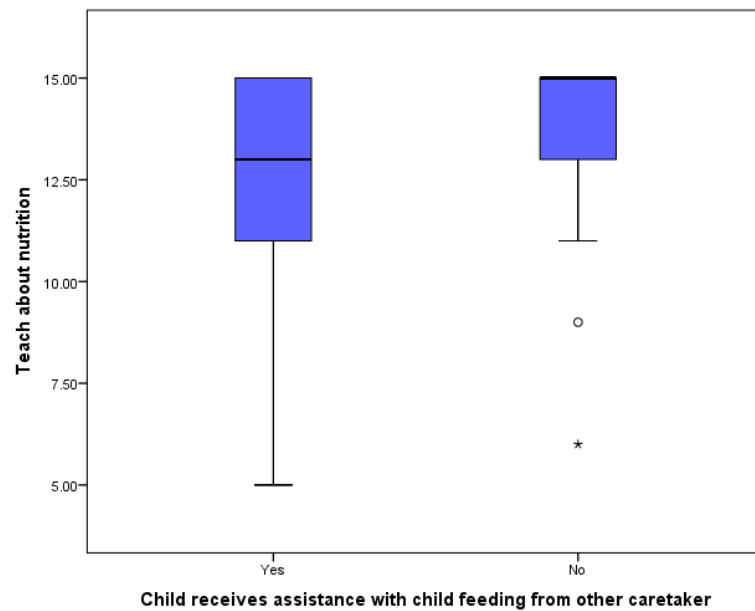
Figure 6. Relationship for mothers who receive caretaker assistance with child feeding and mothers who teach children about nutrition.
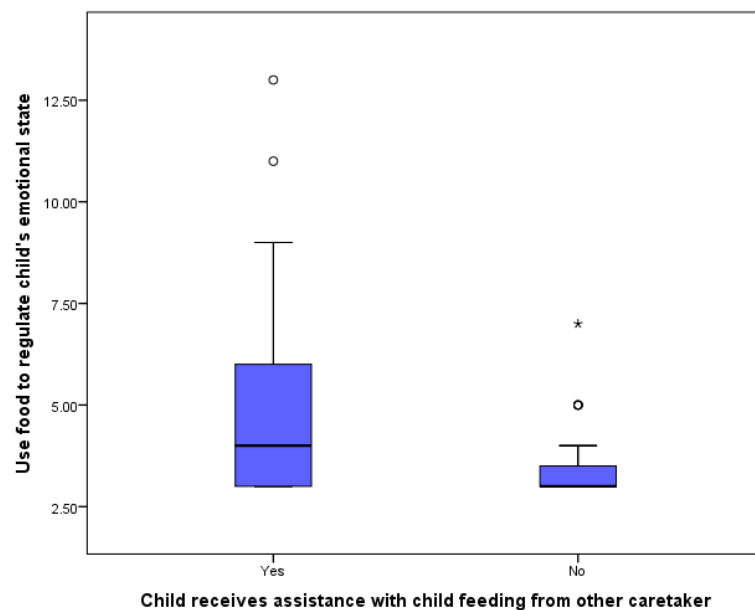
Figure 7. Significant association for mothers who receive caretaker assistance with child feeding and maternal use of food to regulate children's emotional regulation.
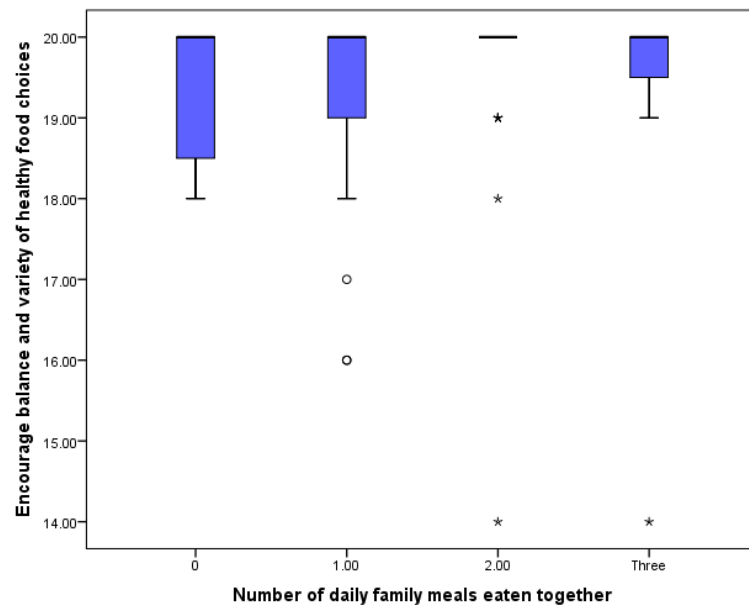
Figure 8. Relationship between the number of daily family meals consumed and maternal encouragement of child dietary balance and variety.
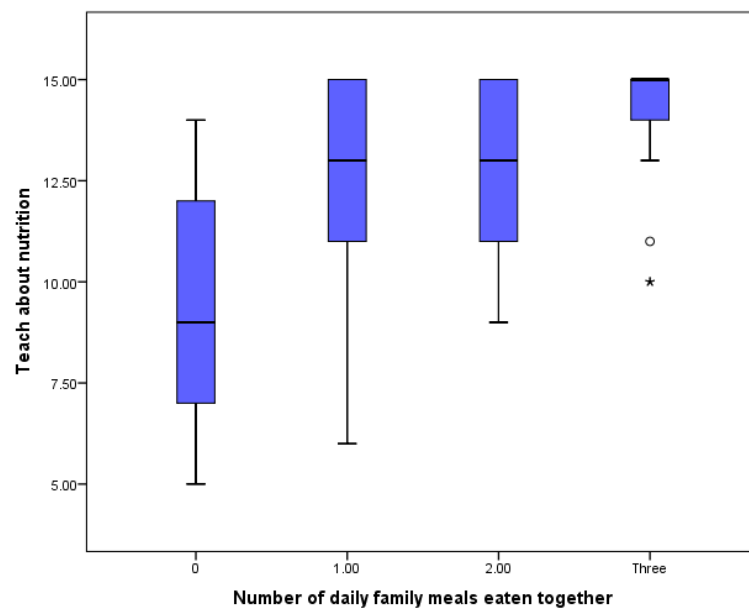
Figure 9. Association between the number of daily family meals consumed and mothers who teach children about nutrition.
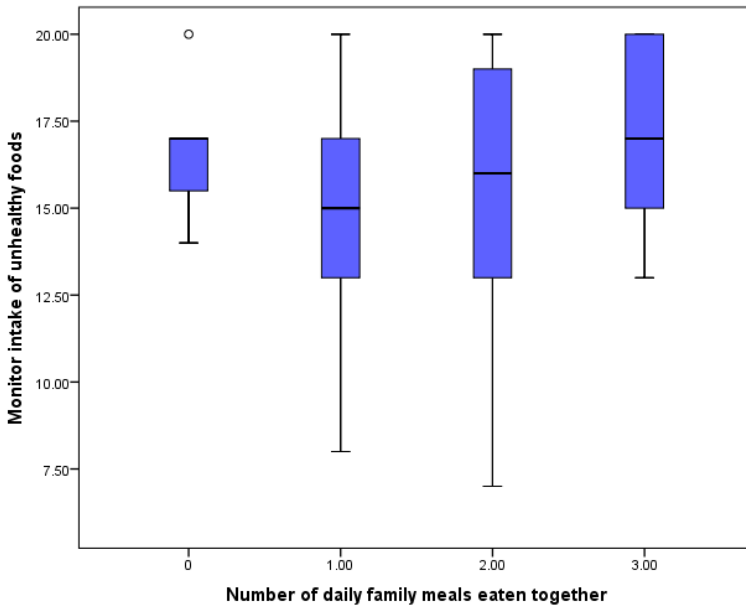
Figure 10. Positive correlation between the number of daily family meals consumed and mothers who monitor children's intake of unhealthy foods.

A two-tailed Spearman rho correlation test was used to assess the association between child-feeding strategies and the children's consumption of both healthy and unhealthy foods, snacks, and beverages. Table XIII provides an overview of the relationships between the CFPQ domains and child dietary intake based on a 7-item open ended questionnaire from the CHIS version 5.1. Based on maternal response, child daily intake of juice, sweetened beverages, fruit, vegetables, and sweets consumed by the children on a daily basis as well as the weekly consumption of fast foods were grouped continuously. Alternately, the Mann Whitney U test was used to assess relationships for children's daily intake of fried potatoes due to maternal report of 0–1.0 serving daily. Thus, intake of fried potatoes was grouped dichotomously as 0 or 1.

There were no correlations between the twelve CFPQ domains and juice, fruit, fried potatoes, or fast food intake. There was a significant positive correlation between the daily juice intake and maternal use of food for emotional regulation (r=0.21, p=0.04). The daily consumption of non-diet sweetened beverages also yielded significant moderately negative correlations with several of the CPFQ domains including: balance and variety (r=-0.32, p=0.001), involvement in meal planning and preparation (r=-0.23, p=0.023), healthy environment (r=-0.31, p=0.002), and monitoring unhealthy foods (r=-0.23, p=0.022). There was also a positive correlation between the daily consumption of sweetened beverages and other sugary drinks and emotional regulation (r=0.24, p=0.018).

In addition, the provision of a healthy food environment in the home was positively correlated with the number of fruits eaten daily by children in the sample (r=0.25, p=0.013). There was a negative correlation for maternal employment of food as reward and child daily intake of vegetables (r=-0.23, p=0.019). Additionally, the practice of rewarding children's behavior with calorie-dense snacks was positively correlated with the number of sweets consumed daily (r=0.25, p=0.013). The amount of sweets snacks eaten was also negatively correlated with maternal encouragement of meal balance and variety (r=-0.24, p=0.015) and monitoring of unhealthy foods (r=-0.29, p=0.004). Finally, weekly consumption of fast food and maternal employment of food as a reward mechanisms were positively correlated (r=0.28, p=0.006). Figures 11–22 depict significant correlations.

TABLE XIII

ASSOCIATIONS BETWEEN CHILD-FEEDING DOMAINS AND CHILD DIETARY INTAKE

CFPQ Domains	Dietary Intake								Fast Food (n=100)
	Juice (n=100)	Sweetened Beverages (n=100)	Fruits (n=99)	Vegetables (n=100)	Sweets (n=100)	Fried Potatoes 0=83 1.0=17			
	Spearman rho (r), p-value	Spearman rho (r), p-value	Spearman rho (r), p-value	Spearman rho (r), p-value	Spearman rho (r), p-value	Mann Whitney U Median (IQR), p-value			Spearman rho (r), p-value
Control	r=0.10, p=0.32	r=0.17, p=0.09	r=0.06, p=0.96	r=-0.16, p=0.12	r=-0.02, p=0.84	13(10,16)	13(10,16)	p=0.74	r=0.08, p=0.44
Balance	r=-0.03, p=0.74	r=-0.32**, p=0.00	r=0.04, p=0.45	r=0.02, p=0.83	r=-0.24*, p=0.02	20(19,20)	20(20,20)	p=0.32	r=-0.15, p=0.15
Involve	r=0.00, p=0.93	r=-0.23*, p=0.02	r=0.01, p=0.64	r=0.14, p=0.16	r=-0.08, p=0.45	13(10,15)	13(9,15)	p=0.85	r=-0.04, p=0.67
Model	r=0.03, p=0.79	r=-0.11, p=0.29	r=0.16, p=0.17	r=0.09, p=0.36	r=-0.05, p=0.64	19(16,20)	20(18,20)	p=0.26	r=0.10, p=0.33
Environment	r=0.04, p=0.71	r=-0.31**, p=0.00	r=0.25**, p=0.01	r=-0.14, p=0.16	r=-0.09, p=0.37	17(15,18)	17(14,20)	p=0.43	r=-0.08, p=0.43
Teach	r=0.11, p=0.29	r=-0.05. p=0.61	r=0.09, p=0.37	r=0.12, p=0.24	r=-0.16, p=0.11	13(11,15)	13(11,15)	p=0.62	r=-0.15, p=0.14
Monitor	r=-0.04, p=0.68	r=-0.23*, p=0.02	r=0.08, p=0.42	r=0.08, p=0.43	r=-0.29**, p=0.00	16(13,18)	16(14,19)	p=0.61	r=-0.11, p=0.29
Regulation	r=0.21*, p=0.04	r=0.24*, p=0.02	r=-0.02, p=0.85	r=-0.15, p=0.15	r=-0.01, p=0.90	3(3,5)	3(3,5)	p=0.58	r=0.05, p=0.65
Reward	r=-0.09, p=0.38	r=0.08, p=0.45	r=-0.06, p=0.57	r=-0.23*, p=0.02	r=0.25**, p=0.01	8(5,11)	8(5,14)	p=0.63	r=0.28**, p=0.00
Pressure	r=-0.11, p=0.27	r=0.01, p=0.93	r=0.17, p=0.09	r=0.00, p=0.95	r=-0.02, p=0.86	14(9,17)	12(9,17)	p=0.56	r=-0.07, p=0.51
Restrict for Health	r=-0.14, p=0.17	r=0.01, p=0.96	r=-0.10, p=0.31	r=-0.10, p=0.32	r=0.05, p=0.61	16(12,19)	17(15,19)	p=0.46	r=0.18, p=0.08
Restrict for Weight	r=-0.00, p=0.96	r=0.01, p=0.93	r=-0.10, p=0.35	r=0.07, p=0.47	r=-0.04, p=0.73	14(11,19)	16(11,20)	p=0.27	r=0.08, p=0.42

*p<0.05
**p<0.01
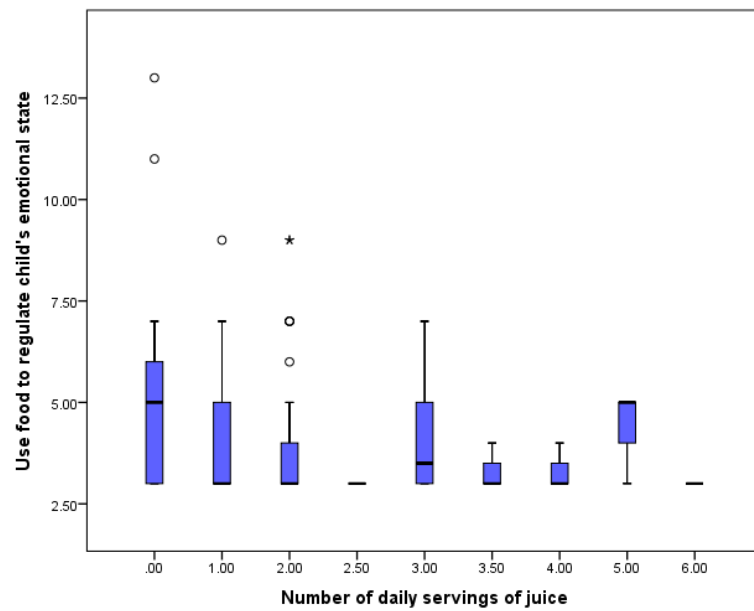
Figure 11. Positive correlation for daily juice consumption and maternal use of food to regulate children's emotions.
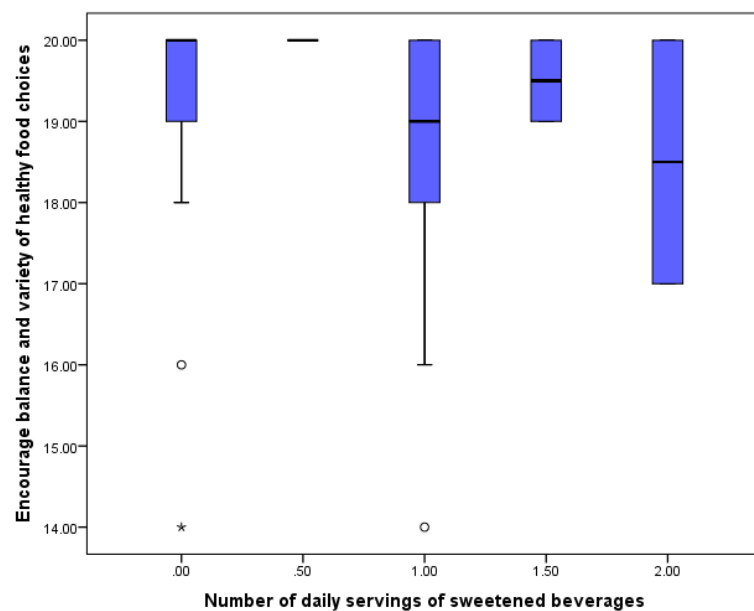
Figure 12. Negative correlation between the number of sweetened beverages and maternal encouragement of dietary balance and variety.
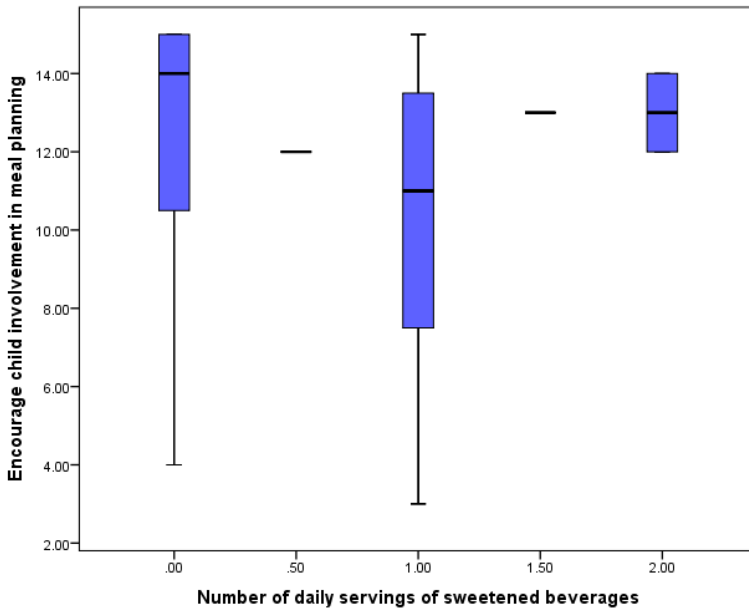
Figure 13. Negative correlation between the number of sweetened beverages children drink and maternal involvement of children in meal planning.
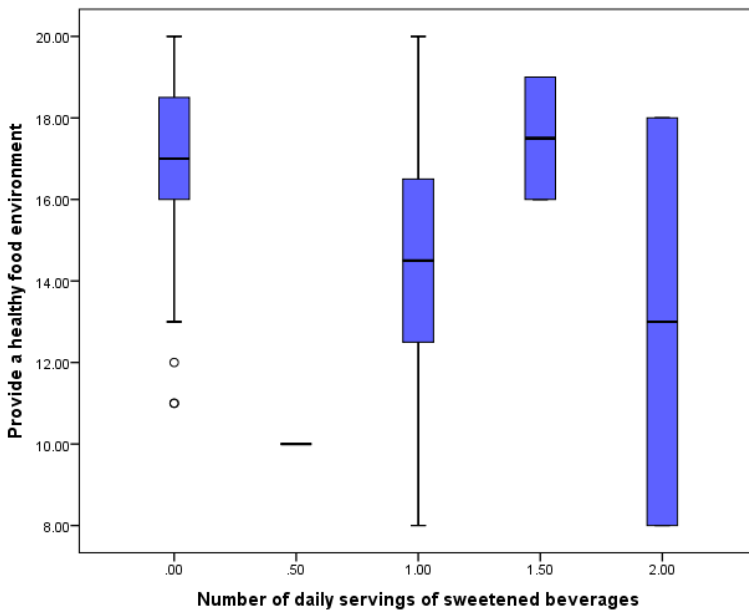
Figure 14. Negative correlation for the number of sweetened beverages consumed and the provision of a healthy food environment in the home.
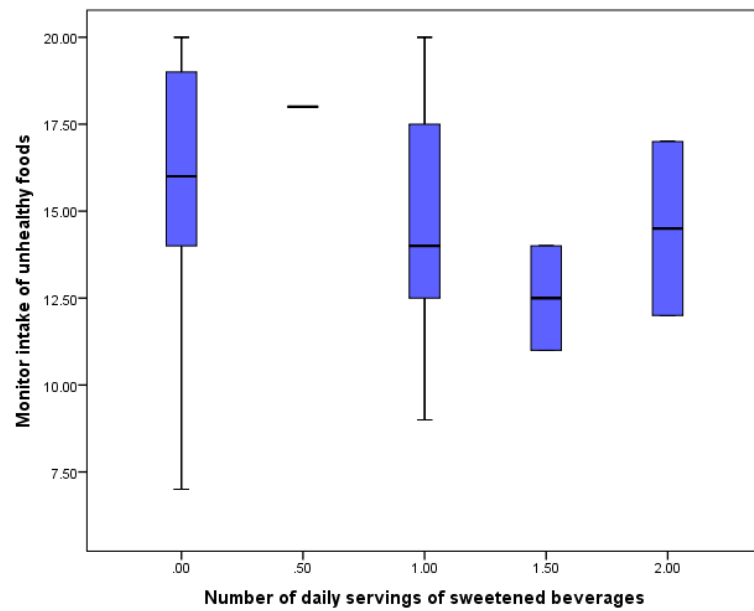
Figure 15. Negative correlation between the amount of sweetened beverages consumed daily and maternal monitoring of children's intake of unhealthy foods.
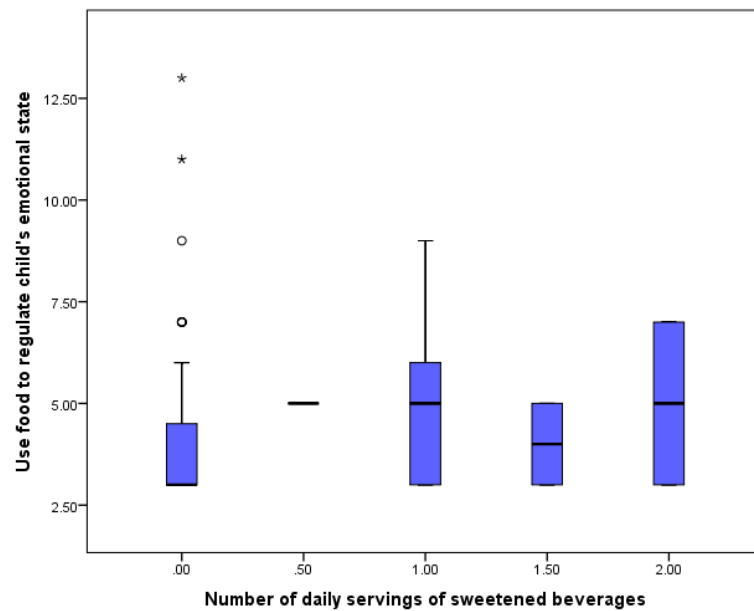
Figure 16. Positive correlation between the daily amount of sweetened beverages and maternal use of food to regulate children's emotional state.
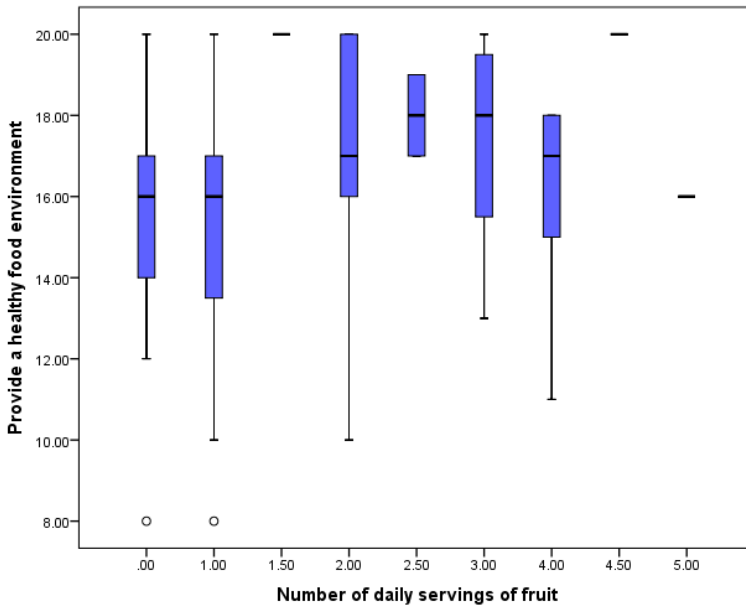
Figure 17. Positive correlation between the number of fruit servings children consumed on a daily basis and a healthy food environment provided at home.
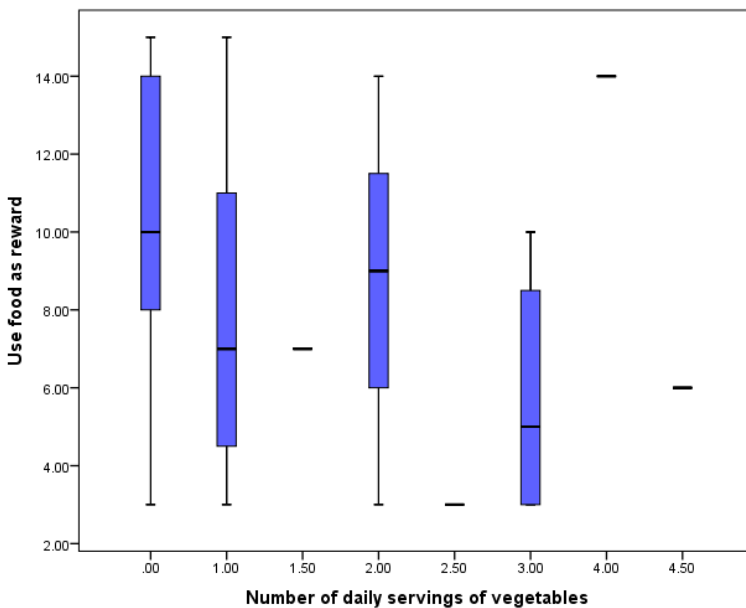
Figure 18. Negative correlation between the daily number of vegetable servings eaten and mothers who reward children with food.
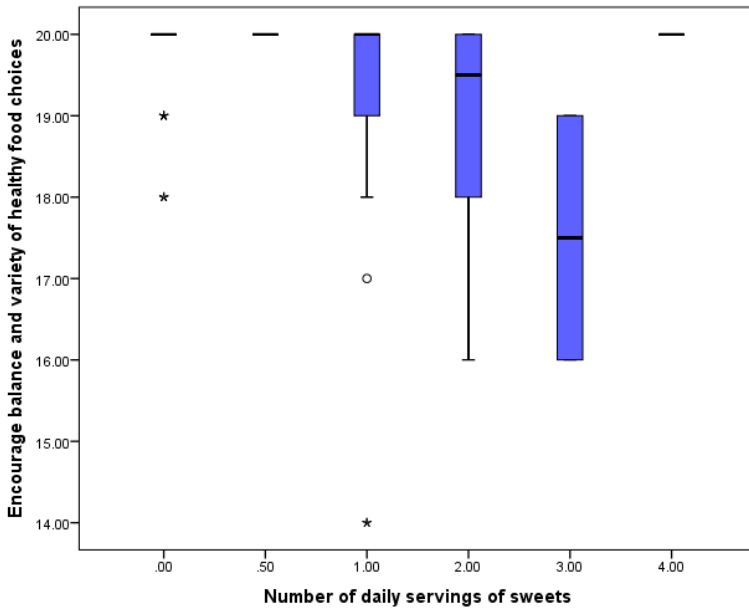
Figure 19. Negative correlation for number of sweets consumed and maternal encouragement of dietary balance and variety.
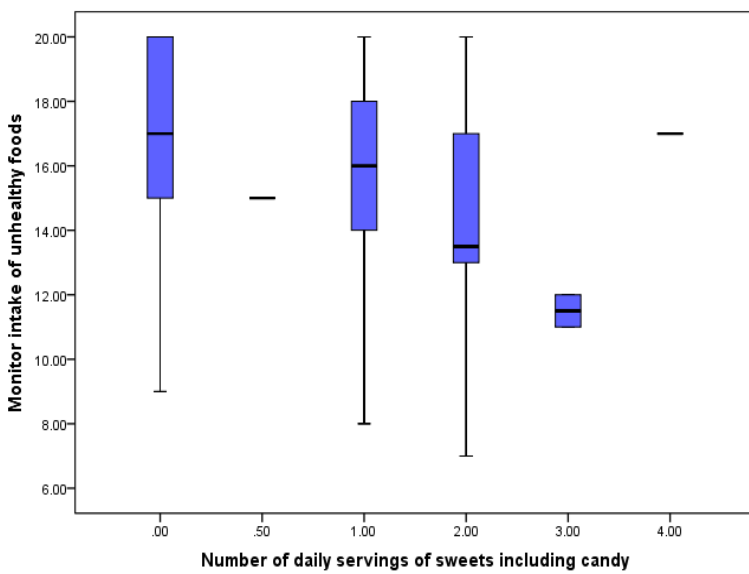
Figure 20. Negative correlation between the daily intake of sweets and mothers who monitor children's intake of unhealthy foods.
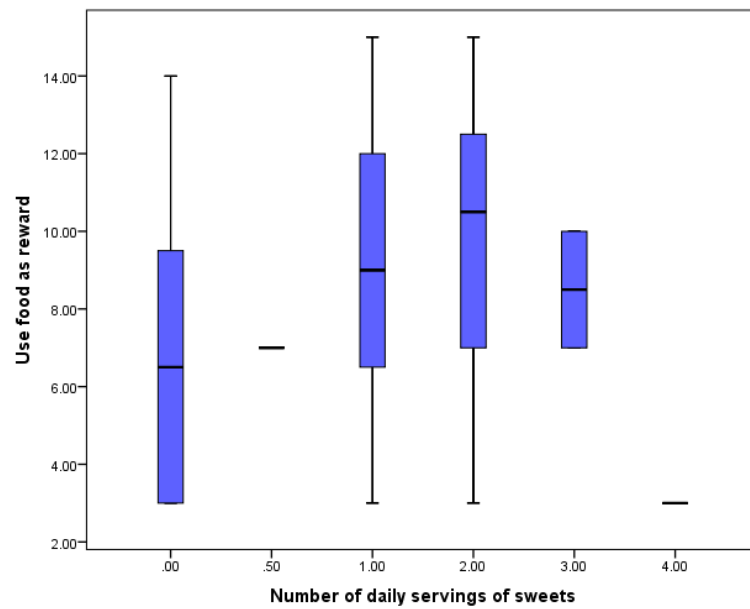
Figure 21. Positive correlation for the number of sweets eaten daily and maternal use of food as a reward.
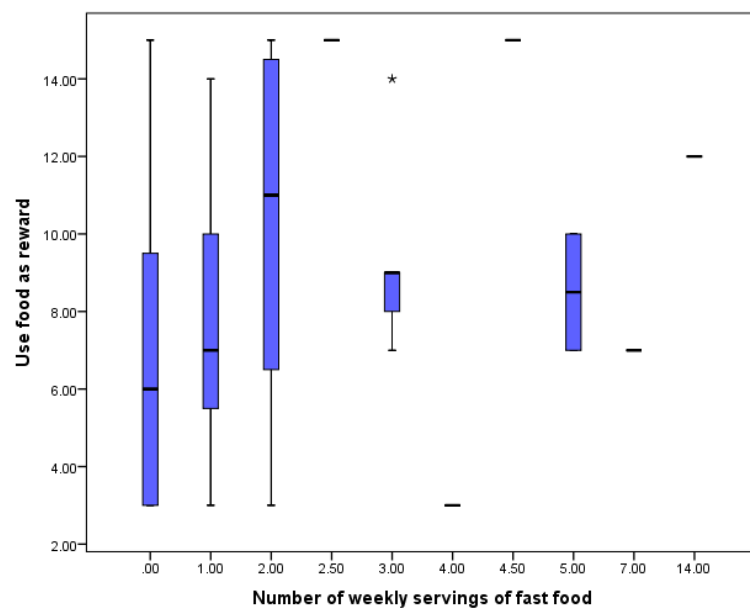
Figure 22. Positive correlation between the weekly servings of fast food consumed by children and maternal employment of rewarding with food.

c.   **Child-feeding practices and maternal and child characteristics**

Bivariate analyses were conducted to establish relationships between the CFPQ domains and maternal and child characteristics. The Mann Whitney U and Kruskal Wallis H tests were used to determine associations between the CFPQ domains and marital status, level of education, employment status, annual household income, and child's sex. Maternal educational level was significantly associated with the mother's likelihood to monitor children's unhealthy dietary intake ($p=0.05$). There was a significant relationship established for maternal involvement of children in meal planning based on annual income ($p=0.03$).

Spearman rho correlation coefficient was used to assess relationships between the CFPQ domains and maternal age, child age, and the number of children per household. Maternal age was correlated with four of the CFPQ domains. Maternal age had a positive correlation with the provision of a healthy food environment ($r=0.28$, $p=0.005$) and monitoring child meals ($r=0.22$, $p=0.030$). There were negative moderate relationships between maternal age and the use of food as reward ($r=-0.31$, $p=0.002$) and pressure to eat ($r=-0.39$, $p=0.000$). Child age was positively correlated with involvement in meal planning and preparation ($r=0.26$, $p=0.009$) and negatively correlated with emotional regulation ($r=-0.20$, $p=0.043$). The number of children per household yielded a positive moderate correlation with access to a healthy food environment at home ($r=0.29$, $p=0.003$) and a negative moderate correlation with the use of food as a strategy for the regulation of children's emotional state ($r=-0.20$, $p=0.05$). Tables XIV–XVI summarize the relationships between the CFPQ domains and the aforementioned descriptors for participating mothers and children. Significant relationships are presented in Figures 23–32.

TABLE XIV

RELATIONSHIPS BETWEEN CHILD-FEEDING DOMAINS AND MATERNAL SOCIOECONOMIC STATUS

CFPQ Domains	Annual Income <$20K=33	$20-$39K =38	≥$40K=23	p-value	Level of Education ≤ High school=33	≥Some college=67	p-value	Employment Status Employed=70	Unemployed=30	p-value
Test	Mann Whitney U Median (IQR)			p-value	Mann Whitney U Median (IQR)		p-value	Mann Whitney U Median (IQR)		p-value
Control	12(10,17)	14(11,16)	12(8,15)	p=0.08	13(10,17)	13(10,16)	p=0.89	13(10,16)	13(10,17)	p=0.50
Balance	20(19,20)	20(19,20)	20(19,20)	p=0.63	20(19,20)	20(19,20)	p=0.45	20(19,20)	20(19,20)	p=0.46
Involve	13(11,15)	14(13,15)	11(8,15)	p=0.03*	14(11,15)	13(9,15)	p=0.46	13(10,15)	13(10,15)	p=0.44
Model	20(18,20)	20(17,20)	18(16,20)	p=0.28	20(16,20)	19(17,20)	p=0.98	20(17,20)	20(18,20)	p=0.53
Environment	16(14,19)	17(15,19)	17(16,18)	p=0.50	16(13,19)	17(15,18)	p=0.14	17(15,18)	16(14,19)	p=0.28
Teach	13(11,15)	14(13,15)	13(11,15)	p=0.14	13(11,15)	13(11,15)	p=0.60	13(11,15)	14(11,15)	p=0.72
Monitor	16(13,18)	16(14,20)	16(14,18)	p=0.56	14(13,18)	16(14,19)	p=0.05*	16(14,18)	16(14,19)	p=0.93
Regulation	3(3,5)	4(3,5)	3(3,6)	p=0.73	4(3,6)	3(3,5)	p=0.28	3(3,5)	4(3,6)	p=0.21
Reward	9(6,14)	7(3,10)	8(5,11)	p=0.27	10(7,13)	7(4,11)	p=0.06	7(5,11)	9(7,13)	p=0.16
Pressure	14(10,17)	13(8,17)	13(10,16)	p=0.94	14(11,17)	12(8,16)	p=0.10	14(10,17)	13(8,17)	p=0.65
Restrict for Health	16(14,19)	16(14,19)	16(12,19)	p=0.99	17(16,20)	16(12,19)	p=0.21	16(13,19)	16(15,19)	p=0.73
Restrict for Weight	13(11,19)	15(11,21)	15(11,19)	p=0.52	11(9,18)	15(11,20)	p=0.11	15(11,19)	13(11,19)	p=0.75

*p<0.05
**p<0.01

TABLE XV

RELATIONSHIPS BETWEEN CHILD-FEEDING DOMAINS AND MATERNAL CHARACTERISTICS

CFPQ Domains	Maternal Age n=100		Marital Status Married=32	Single=67	
Test	Spearman rho (r)	p-value	Mann Whitney U Median (IQR)		p-value
Control	r=-0.15	p=0.13	13(10,17)	13(11,16)	p=0.90
Balance	r=0.12	p=0.24	20(19,20)	20(19,20)	p=0.57
Involve	r=-0.12	p=0.23	14(9,15)	13(11,15)	p=0.99
Model	r=-0.03	p=0.78	20(18,20)	19(17,20)	p=0.79
Environment	r=0.28**	p=0.00	16(14,18)	17(15,19)	p=0.15
Teach	r=0.15	p=0.14	13(11,15)	14(11,15)	p=0.76
Monitor	r=0.22*	p=0.03	16(13,19)	16(14,18)	p=1.00
Regulation	r=-0.12	p=0.25	3(3,6)	3(3,5)	p=0.62
Reward	r=-0.31**	p=0.00	10(7,12)	7(5,11)	p=0.12
Pressure	r=-0.39**	p=0.00	14(10,19)	13(8,17)	p=0.42
Restrict for Health	r=-0.11	p=0.28	17(14,20)	16(13,19)	p=0.35
Restrict for Weight	r=0.19	p=0.06	16(11,19)	13(10,19)	p=0.29

*p<0.05
**p<0.01

TABLE XVI

RELATIONSHIPS BETWEEN CHILD-FEEDING DOMAINS AND CHILD CHARACTERISTICS

CFPQ Domains	Child Age (n=100)		Child's Sex Male=45, Female=55			Number of Children (n=100)	
Test	Spearman rho (r)	p-value	Mann Whitney U		p-value	Spearman rho (r)	p-value
Control	r=0.01	p=0.90	13(11,16)	13(10,16)	p=0.98	r=-0.18	p=0.07
Balance	r=0.13	p=0.20	20(19,20)	20(19,20)	p=0.63	r=0.07	p=0.52
Involve	r=0.26**	p=0.01	13(9,15)	13(11,15)	p=0.12	r=-0.09	p=0.37
Model	r=0.13	p=0.18	19(17,20)	20(16,20)	p=0.87	r=-0.13	p=0.20
Environment	r=0.02	p=0.84	17(15,18)	17(14,18)	p=0.81	r=0.29**	p=0.00
Teach	r=0.09	p=0.38	13(11,15)	13(11,15)	p=0.94	r=0.08	p=0.43
Monitor	r=-0.07	p=0.51	16(13,18)	16(14,18)	p=0.50	r=-0.06	p=0.59
Regulation	r=-0.20*	p=0.04	3(3,5)	3(3,5)	p=0.88	r=-0.20*	p=0.05
Reward	r=0.06	p=0.58	8(4,11)	8(6,12)	p=0.61	r=-0.13	p=0.19
Pressure	r=0.01	p=0.94	13(10.17)	13(8,17)	p=0.60	r=-0.02	p=0.86
Restrict for Health	r=0.07	p=0.49	17(14,20)	16(13,18)	p=0.18	r=-0.07	p=0.49
Restrict for Weight	r=0.07	p=0.52	13(11,19)	15(10,19)	p=0.87	r=0.03	p=0.76

*p<0.05
**p<0.01
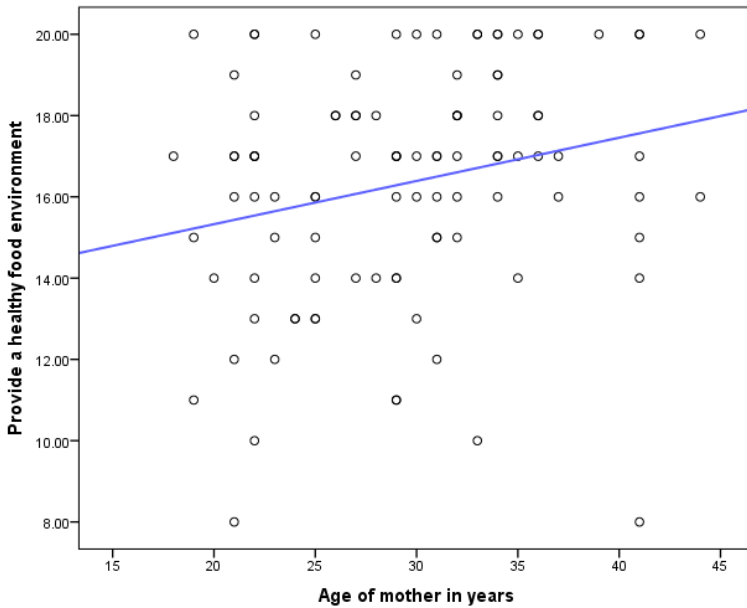
Figure 23. Positive correlation between mother's age and the likelihood of providing a healthy household food environment.
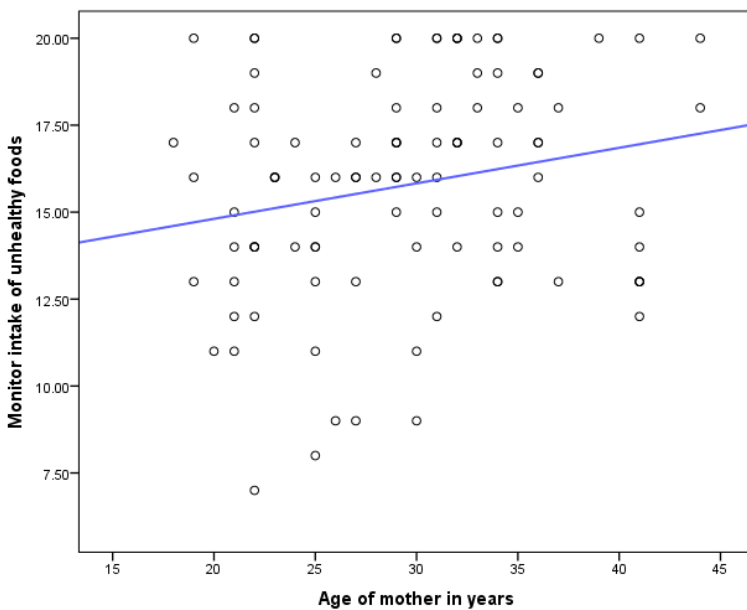
Figure 24. Positive correlation between the age of the child's mother and maternal monitoring of children's consumption of unhealthy foods.

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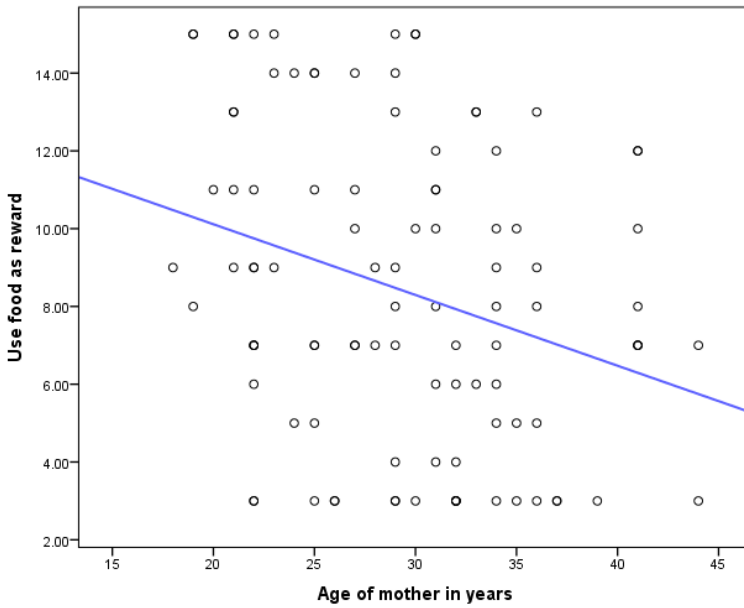
Figure 25. Negative correlation between maternal age and maternal use of food as a reward.
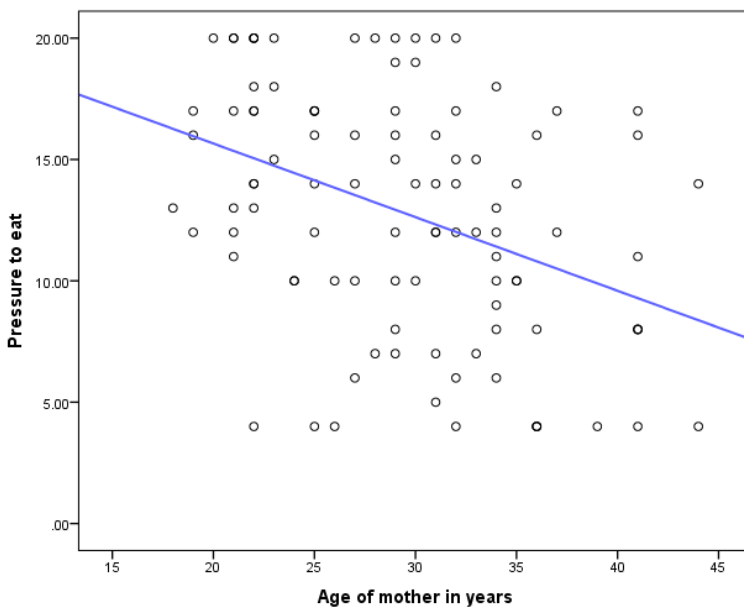
Figure 26. Negative correlation between a mother's age and mothers who pressure children to eat more food.
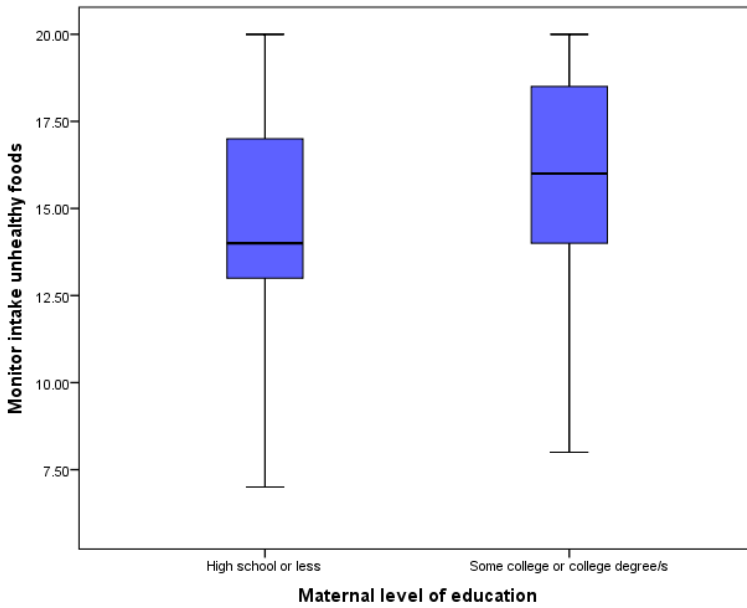
Figure 27. Relationship between a mother's level of education and maternal likelihood to monitor children's intake of unhealthy meals.
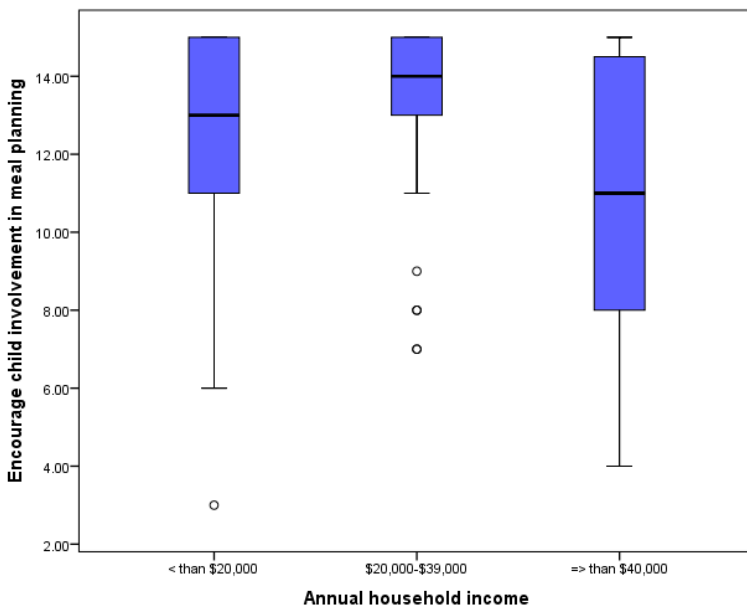
Figure 28. Relationship between maternal household income and the involvement of children in meal planning and preparation.
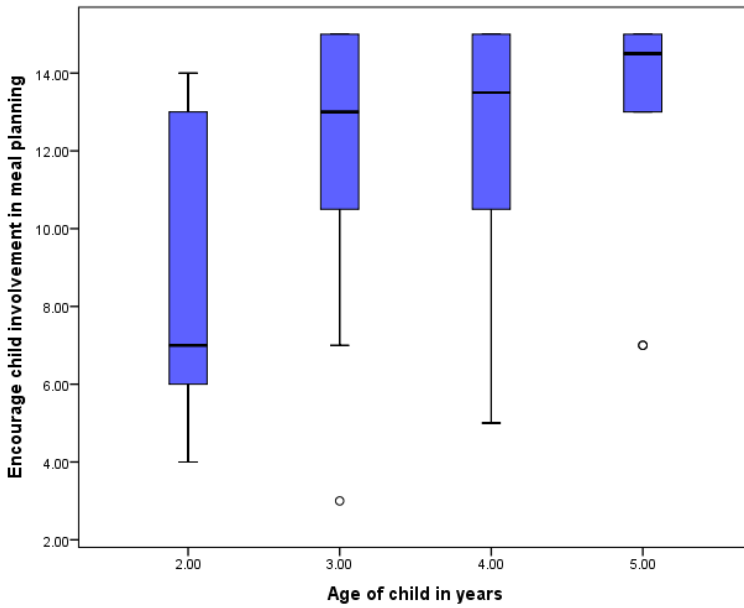
Figure 29. Positive correlation between children's age and maternal involvement of children in meal planning and preparation.
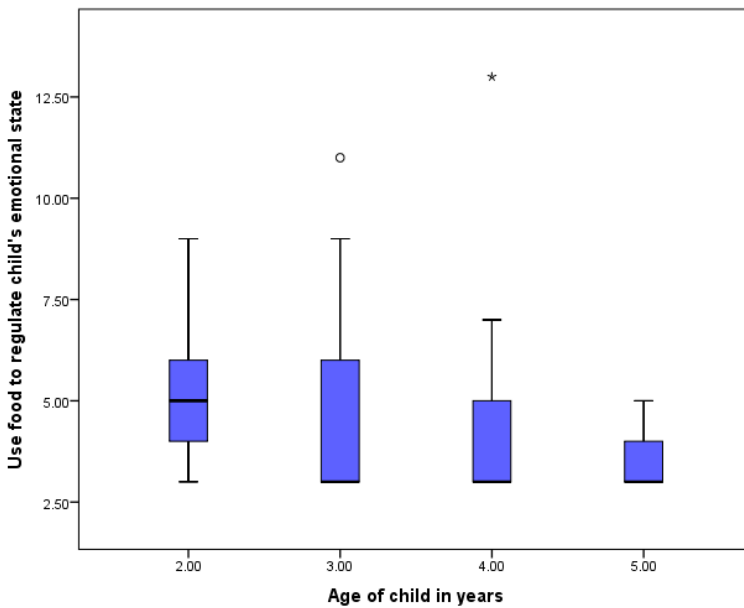
Figure 30. Negative correlation for maternal employment of food to regulate the emotional state of a child in relation to the child's age.
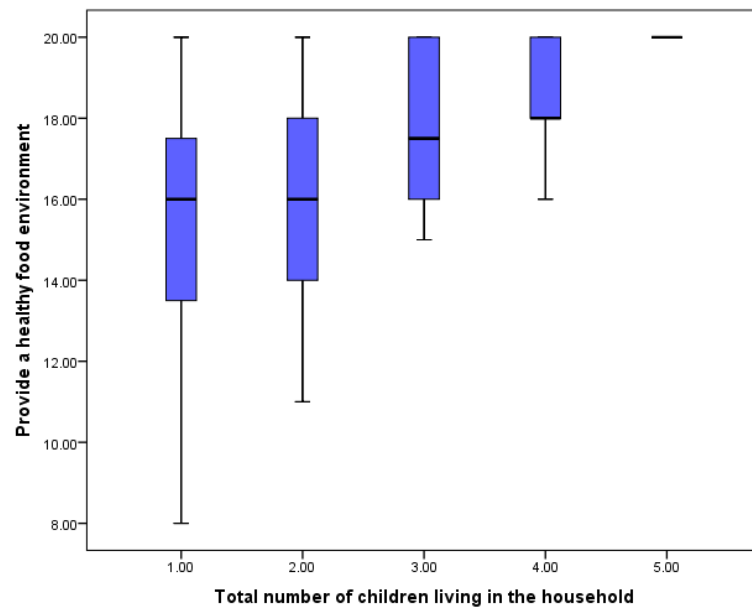
Figure 31. Positive correlation between the number of children in the household and maternal likelihood to provide healthy food options at home.
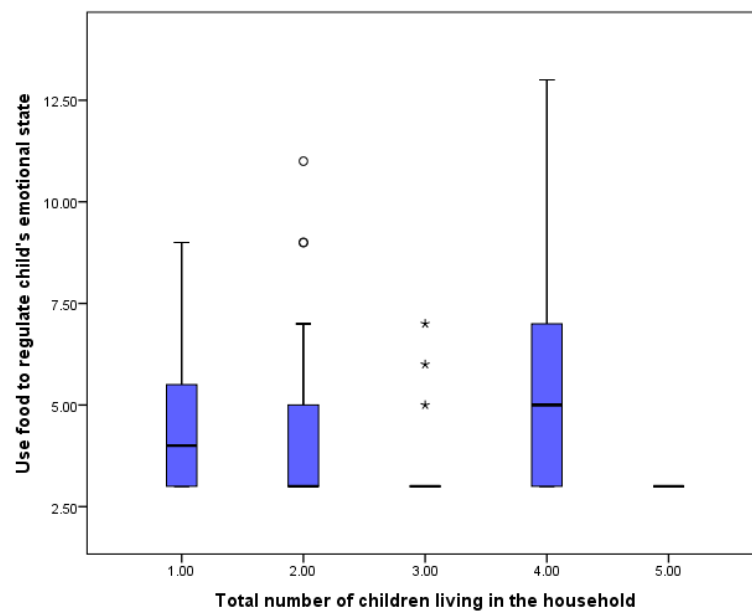
Figure 32. Negative correlation between the number of children per household and maternal use of food to regulate children's emotions.

2.   **<u>Child anthropometric measures</u>**

This section will employ bivariate analyses to examine relationships between the anthropometric measures of the Puerto Rican children sampled in this study from six early childhood centers located in the HP community. The analyses explore **Specific Aim 2**: to determine the relationship between child anthropometric measures (age- and sex-specific BMI and WC) and: (a) child-feeding characteristics, (b) maternal anthropometric indicators, and (c) maternal and child characteristics.

a.   **<u>Child anthropometric measures and child-feeding characteristics</u>**

The Mann Whitney U and Kruskal Wallis H tests were used to assess associations between both child BMI and WC percentiles and household feeding characteristics: assistance with child feeding, meal preparation, and monitoring meals. The Spearman rho correlation was used to determine relationships between feeding indicators and the number of family meals eaten on a daily basis. There were no associations between household characteristics and child anthropometric measures. Table XVII displays the results of the non-parametric tests for child anthropometry and child-feeding descriptors.

The Spearman rho correlation and Mann Whitney U tests were also used to determine the relationship between child anthropometric measures and maternal report of child dietary intake. No correlations were established. A summary of these findings appears in Table XVIII.

TABLE XVII

RELATIONSHIPS BETWEEN ANTHROPOMETRIC MEASURES AND
CHILD-FEEDING CHARACTERISTICS

Feeding Characteristics	Anthropometric Measures		
	Test	BMI Percentiles	WC Percentiles
Assist Feeding Yes=72	Mann Whitney U		
		68(60,90)	5(4,5)
No=28		72(60,85)	5(4,5)
p-value		p=0.78	p=0.87
Assist Meal Preparation	Mann Whitney U		
Yes=70		68(60,86)	5(4,5)
No=30		72(55,88)	5(4,5)
p-value		p=0.54	p=0.51
Assist Meal Monitoring	Mann Whitney U		
Yes=73		68(60,87)	5(4,5)
No=27		75(60,87)	5(4,5)
p-value		p=0.50	p=0.84
Number of Family Meals (n=100)	Spearman rho (r), p-value	r=0.03, p=0.75	r=-0.01, p=0.96

* p<0.05

** p<0.01

TABLE XVIII

RELATIONSHIPS BETWEEN CHILD ANTHROPOMETRIC MEASURES AND
CHILD DIETARY INTAKE

Dietary Intake	Anthropometric Measures		
	Test	BMI Percentiles	WC Percentiles
Juice	Spearman rho (r)	r=0.11	r=0.15
(n=100)	p-value	p=0.28	p=0.13
Sweetened Beverages (n=100)	Spearman rho (r)	r=0.05	r=0.13
	p-value	p=0.67	p=0.19
Fruits	Spearman rho (r)	r=-0.13	r=-0.02
(n=99)	p-value	p=0.20	p=0.84
Vegetables (n=100)	Spearman rho (r)	r=0.03	r=0.11
	p-value	p=0.73	p=0.26
Sweets	Spearman rho (r)	r=0.13	r=0.17
(n=100)	p-value	p=0.20	p=0.10
Fried Potatoes	Mann Whitney U		
0=83		68(60,90)	5(4,5)
1=17		70(49,82)	5(4,6)
p-value		p=0.95	r=0.39
Fast Food	Spearman rho (r)	r=-0.01	r=0.07
(n=100)	p-value	p=0.95	p=0.47

* p<0.05

** p<0.01

b. **Child and maternal anthropometric measures**

A two-tailed Spearman rho correlation coefficient was used to determine the relationship between the crude values for the maternal anthropometric measures and the percentiles for the child anthropometric measures. Table XIX displays results of the Spearman rho correlation tests for maternal and child anthropometric measures. There was no significant correlation between the crude values for maternal BMI and child BMI percentiles. However, there was a significant moderate positive correlation between maternal WC and child WC percentiles (r=0.23, p=0.02). See Figure 33 for a diagram of this relationship.

TABLE XIX

RELATIONSHIPS BETWEEN MATERNAL AND CHILD ANTHROPOMETRIC
MEASURES

Child Anthropometric Measures	Maternal Anthropometric Measures—Spearman rho (r), p-value	
	Maternal BMI (kg/m^2)	Maternal WC (cm)
Child BMI percentiles	r=0.09, p=0.38	
Child WC percentiles		r=0.23*, p=0.02

* p<0.05
** p<0.01
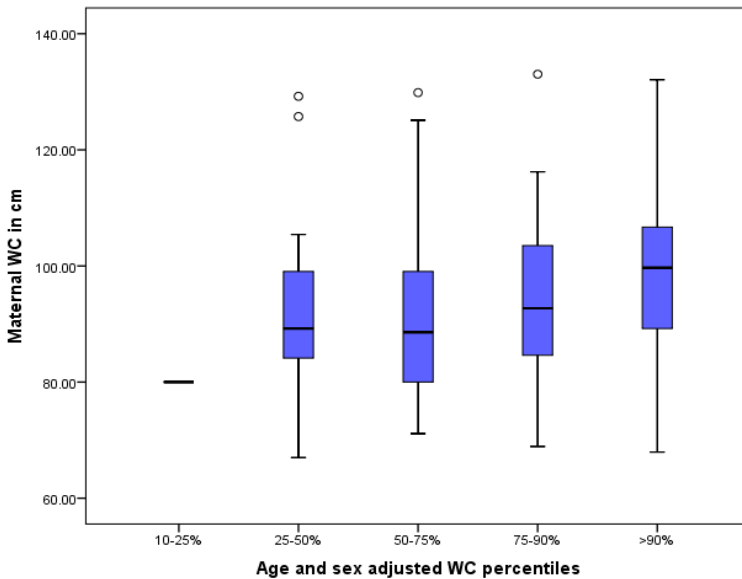
Figure 33. Positive correlation between maternal waist circumference and child waist circumference percentiles.

c. **Child anthropometric measures and maternal and child**

characteristics

The relationship between child anthropometric measures and maternal and child characteristics were observed. First, analyses were conducted to determine the relationship between child anthropometric values and maternal report of child health indicators. The Spearman rho correlation coefficient was used to assess child BMI and WC and maternal perception of child health status based on a 5-point Likert scale (5=excellent to 1=poor). Child health status was not correlated with either of the anthropometric measures: BMI or WC percentiles. The Mann Whitney U test was used to determine associations between child anthropometric measures and maternal concern over child weight issues. There were no relationships established between concern for weight and child BMI or WC. Table XX provides

a summary of the findings for assessing the relationship between child anthropometric measures and child health status indicators.

TABLE XX

RELATIONSHIPS BETWEEN CHILD ANTHROPOMETRIC MEASURES AND
CHILD HEALTH STATUS INDICATORS

Child Anthropometric Measures	Child Health Status Indicators			
	Health Status (n=100)	Concerned Weight Status		
		Yes=18	No=82	p-value
Test	Spearman rho (r), p-value	Mann Whitney U		
Child BMI percentiles	r=0.14, p=0.17	81(55,96)	68(60,81)	p=0.13
Child WC percentiles	r=0.12, p=0.23	5(4,6)	5(4,5)	p=0.34

* p<0.05
** p<0.01

A test of agreement was also conducted using the weighted kappa (K_w) to determine the relationship between the actual child anthropometric percentiles and maternal perception of child weight as well as maternal report of physician diagnosis of child weight. There was poor agreement between the mothers' perception and the child's true weight status [K_w=0.13(-0.01, 0.26)]. In addition, sensitivity for perceiving overweight was poor, 15% [Sens=P(T+| True+)=4/27], although specificity was high, 99.0% [Spec=P(T-| True-)=71/72]. However, there was stronger agreement with maternal report of physician assessment of child's

weight status [$K_w=0.30(0.11, 0.49$] with a higher but still poor sensitivity of diagnosis of

overweight, 32% [Sens=P(T+| True+)=9/28], with only a slight decrease in specificity, 94%

[Spec=P(T-| True-)=68/72]. Tables XXI and XXII display summaries of agreement assessments

between maternal reports of child anthropometry and the percentile categories calculated by the

investigator.

TABLE XXI

AGREEMENT BETWEEN MATERNAL REPORT OF CHILD WEIGHT AND
ACTUAL CHILD ANTHROPOMETRY

Maternal	True Weight Status		
Perception	Underweight	Right weight	Overweight
Underweight	0	8	2
Right Weight	1	62	21
Overweight	0	1	4

Maternal	True Weight Status	
Perception	No	Yes
No	71	23
Yes	1	4

TABLE XXII

AGREEMENT BETWEEN MATERNAL REPORT OF PHYSICIAN DIAGNOSIS AND
ACTUAL CHILD ANTHROPOMETRY

Physician Assessment	True Weight Status		
	Underweight	Right weight	Overweight
Underweight	0	1	0
Right Weight	1	66	19
Overweight	0	4	9

Physician Assessment	True Weight Status	
	No	Yes
No	68	19
Yes	4	9

Next, the associations between child BMI and WC percentiles and marital status, education, employment, and child's sex based on the Mann Whitney U test of association determined a significant relationship between BMI percentiles and the sex of the child (p=0.006) as well as between WC and the presence of older siblings (p=0.037).

The Spearman rho correlation coefficient was used to assess the child BMI and WC percentiles in relation to maternal age, household income, child age, and the number of children in the household. The number of children per household yielded a statistically significant moderate negative correlation with child WC (r=-0.22, p=0.03). The relationships between the child anthropometric measures and the aforementioned parent and child descriptors are summarized below in Tables XXIII–XXV. Figures 34–36 display the significant relationships between child anthropometric measures and household characteristics.

TABLE XXIII

RELATIONSHIPS BETWEEN CHILD ANTHROPOMETRIC MEASURES AND MATERNAL SOCIOECONOMIC STATUS

Child Anthropometric Indicators	Annual Income				Level of Education			Employment Status		
	<$20K= 33	$20–$39K =38	$40K=23		≤ High School=33	≥ College =67	p-value	Employed= 70	Unemployed= 30	
Test	Kruskal Wallis H			p-value	Mann Whitney U			Mann Whitney U		p-value
BMI Percentiles	68(50,83)	66(34,82)	68(61,93)	p=0.74	69(60,93)	68(60,81)	p=0.28	69(45,91)	69(60,87)	p=0.43
WC Percentiles	5(4,5)	5(4,5)	4(3,5)	p=0.48	5(4,6)	5(4,5)	p=0.37	5(4,5)	5,(4.6)	p=0.70

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

TABLE XXIV

RELATIONSHIPS BETWEEN CHILD ANTHROPOMETRIC MEASURES AND MATERNAL CHARACTERISTICS

Child Anthropometric Indicators	Maternal Age		Marital Status		
	(n=100)		Married=32	Single=67	p-value
Test	Spearman rho (r)	p-value	Mann Whitney U		
BMI Percentiles	r=-0.16	p=0.31	67(60,85)	74(60,92)	p=0.90
WC Percentiles	r=-0.13	p=0.65	5(4,5)	5(4,5)	p=0.70

* p<0.05
** p<0.01

TABLE XXV

RELATIONSHIPS BETWEEN CHILD ANTHROPOMETRIC MEASURES AND CHILD CHARACTERISTICS

Child Anthropometric Indicators	Child Age	Child's Sex			Number of Children	Older Siblings		
	(n=100)	Male=45	Female=55		(n=100)	Yes=48	No=52	p-value
Test	Spearman rho (r), p-value	Mann Whitney U		p-value	Spearman rho (r), p-value	Mann Whitney U		
BMI Percentiles	r=-0.08, p=0.44	63(35,78)	74(65,90)	p=0.00**	r=-0.16, p=0.12	65(45,78)	72(61,93)	p=0.08
WC Percentiles	r=-0.15, p=0.15	5(4,5)	5(4,6)	p=0.22	r=-0.22*, p=0.03	5(4,5)	5,(4.6)	p=0.04*

* p<0.05
** p<0.01
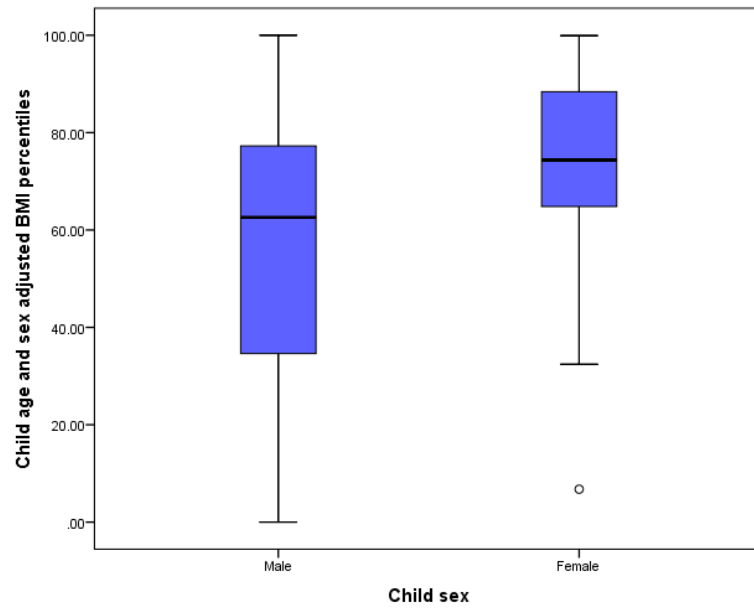
Figure 34. Association between the sex of children and child body mass index percentiles.
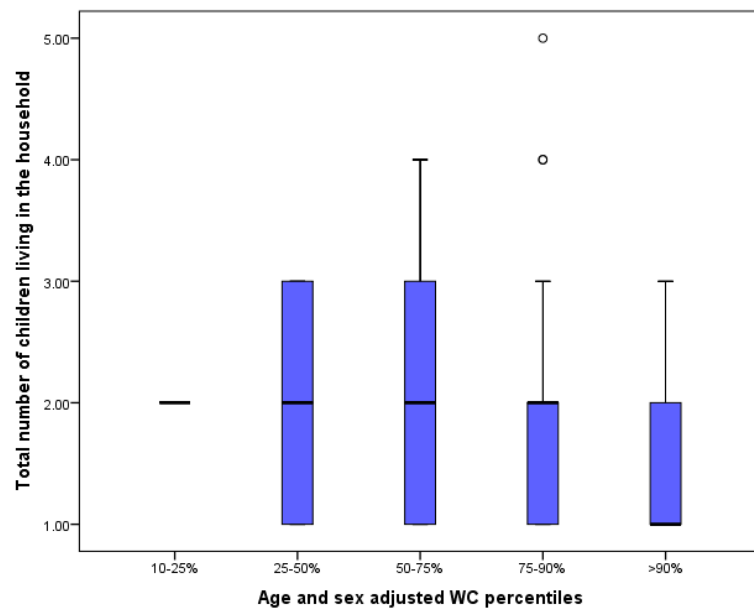
Figure 35. Negative correlation between the number of children per household and child waist circumference.
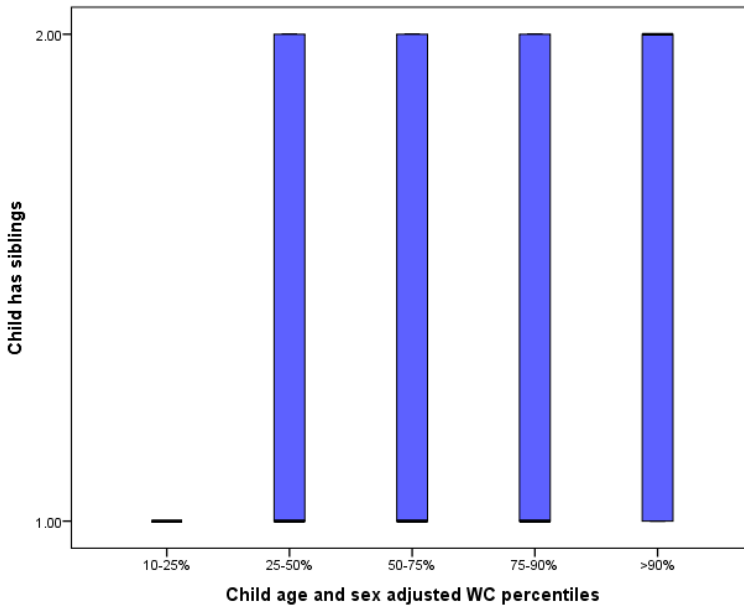
Figure 36. Relationship between the presence of older siblings and child waist circumference.

3. **Acculturation**

This section will explore associations between the acculturation indicators for the Puerto Rican women in the sample using bivariate analyses. The following analyses assess **Specific Aim 3**: to determine the association between acculturation and: (a) maternal child-feeding practices, (b) child-feeding characteristics, and (c) child anthropometry.

a. **Acculturation and child-feeding practices**

The Spearman rho correlation coefficient test was used to determine the relationship between the CFPQ domains and the variables for participant acculturation based on the BSPR instrument, which measures Puerto Rican and American cultural dominance as subscores. For the Puerto Rican domain, there was a negative moderate significant relationship

between Puerto Rican cultural dominance and maternal practice for providing calorie-dense foods as rewards (r=-0.22, p=0.029) and pressuring their child to eat more food (r=-0.24, p=0.015). For the American domain, there was a positive moderate significant relationship between American cultural values and maternal encouragement of child control of their food intake (r=0.20, p=0.044) and food as a reward mechanism (r=0.25, p=0.012).

The Mann Whitney U and Kruskal Wallis H tests were used to understand the relationship between the CFPQ domains and maternal acculturation. There were no significant relationships found for biculturality when the BSPR scale was grouped into the categories bicultural and not bicultural. However, when the values for the Puerto Rican and American cultural domains were grouped into the categories of Puerto Rican dominance, American dominance, bicultural, and unacculturated, there was a significant relationship established between maternal acculturation and the practice of using food as a reward mechanism (p=0.05) as well as pressuring children to eat (p=0.05). In observing other measures of acculturation, the Mann Whitney U and Kruskal Wallis H tests were also used to assess the relationship between the CFPQ domains and nativity as well as generational status. These relationships were insignificant.

Finally, the number of years of residence in the United States was used as a proxy measure to assess the relationship between the CFPQ domains and maternal acculturation using the Spearman rho correlation coefficient. There was a significant difference between years of U.S. residence and five of the CFPQ domains. There was a positive moderate significance with increased residence in the United States and maternal encouragement of dietary balance and variety of healthy foods (r=0.28, p=0.005), provision of a healthy food environment (r=0.23, p=0.019), and monitoring dietary intake (r=0.20, p=0.050). Negative moderate relationships

were also found for maternal strategies of food as reward (r=-0.29, p=0.003) and pressure to eat (r=-0.27, p=0.006). Tables XXVI and XXVII provide a summary of the relationship between the CFPQ domains and acculturation. Figures 37–47 depict diagrams of the established significant relationships between the CFPQ domains and the maternal acculturation indicators.

TABLE XXVI

RELATIONSHIPS BETWEEN ACCULTURATION STATUS AND CHILD-FEEDING DOMAINS

CFPQ Domains	Cultural Dominance				Biculturality			Acculturation Status			
	Puerto Rican-dominant n=100		American-dominant n=100		Bicultural= 70	Not bicultural= 30		Bicultural= 70	American= 8	Puerto Rican=22	
Test	Spearman rho (r) p-value		Spearman rho (r) p-value		Mann Whitney U Median (IQR)		p-value	Kruskal Wallis H Median (IQR)			p-value
Control	r=0.02	p=0.81	r=0.20*	p=0.04	13(10,17)	12(10,15)	p=0.14	12(10,15)	12(10,16)	13(10,17)	p=0.32
Balance	r=0.06	p=0.56	r=-0.03	p=0.75	20(19,20)	20(19,20)	p=0.15	20(19,20)	19(19,20)	20(19,20)	p=0.31
Involve	r=0.03	p=0.75	r=0.06	p=0.55	13(10,15)	13(8,15)	p=0.43	13(9,15)	13(7,13)	13(10,15)	p=0.47
Model	r=0.16	p=0.10	r=0.10	p=0.33	20(17,20)	19(17,20)	p=0.67	19(17,20)	19(18,20)	20(17,20)	p=0.90
Environment	r=0.17	p=0.10	r=-0.09	p=0.37	17(14,18)	17(16,19)	p=0.09	18(16,20)	17(14,18)	17(14,18)	p=0.12
Teach	r=0.07	p=0.47	r=-0.17	p=0.09	13(11,15)	14(11,15)	p=0.32	15(12,15)	13(11,14)	13(11,15)	p=0.22
Monitor	r=0.19	p=0.06	r=-0.05	p=0.65	16(14,18)	17(13,19)	p=0.66	17(14,19)	14(11,18)	16(14,18)	p=0.12
Regulation	r=-0.04	p=0.70	r=-0.05	p=0.64	3(3,5)	4(3,5)	p=0.60	4(3,5)	4(3,5)	3(3,5)	p=0.87
Reward	r=-0.22*	p=0.03	r=0.25**	p=0.01	8(5,12)	8(5,11)	p=0.90	7(3,9)	11(9,15)	8(5,11)	p=0.05*
Pressure	r=-0.24*	p=0.02	r=0.11	p=0.27	13(10,17)	14(9,17)	p=0.68	12(4,16)	17(15,19)	13(10,17)	p=0.05*
Restrict for Health	r=-0.10	p=0.33	r=0.11	p=0.30	17(15,19)	15(12,18)	p=0.13	16(12,18)	15(11,19)	17(15,19)	p=0.31
Restrict for Weight	r=0.07	p=0.50	r=-0.13	p=0.20	13(10,19)	15(11,20)	p=0.37	16(11,20)	13(9,20)	13(10,19)	p=0.41

*p<0.05
**p<0.01

TABLE XXVII

RELATIONSHIPS BETWEEN ACCULTURATION PROXY MEASURES AND CHILD-FEEDING DOMAINS

CFPQ Domains	Nativity			Generational Status			U.S. Residence (years)	
	United States=83	Puerto Rico=16		1st =66	2nd=34		n=100	
Test	Kruskal Wallis H Median (IQR)		p-value	Mann Whitney U Median (IQR)		p-value	Spearman rho (r)	p-value
Control	13(10,16)	13(11,17)	p=0.48	12(10,16)	15(11,16)	p=0.33	r=-0.07	p=0.48
Balance	20(19,20)	20(18,20)	p=0.20	20(19,20)	20(19,20)	p=0.51	r=0.28**	p=0.01
Involve	13(10,15)	13(10,15)	p=0.28	13(10,15)	13(9,15)	p=0.71	r=0.04	p=0.68
Model	20(17,20)	20(18,20)	p=0.21	20(18,20)	19(17,20)	p=0.49	r=0.09	p=0.38
Environment	17(15,18)	17(14,18)	p=0.71	17(15,18)	17(14,18)	p=0.22	r=0.23*	p=0.02
Teach	13(11,5)	13(11,15)	p=0.54	13(11,15)	13(11,15)	p=0.68	r=0.10	p=0.34
Monitor	16(14,18)	14(13,17)	p=0.14	16(14,18)	16(14,19)	p=0.73	r=0.20*	p=0.05
Regulation	3(3,5)	4(3,5)	p=0.70	3(3,5)	4(3,5)	p=0.30	r=-0.14	p=0.17
Reward	8(5,11)	9(7,12)	p=0.24	8(5,11)	9(5,13)	p=0.60	r=-0.29**	p=0.00
Pressure	13(10,17)	12(9,17)	p=0.64	12(8,17)	14(12,17)	p=0.12	r=-0.27**	p=0.01
Restrict for Health	16(14,19)	18(12,20)	p=0.66	16(12,19)	17(15,19)	p=0.61	r=-0.07	p=0.49
Restrict for Weight	14(11,19)	16(11,21)	p=0.57	15(11,19)	15(9,18)	p=0.11	r=0.01	p=0.90

*p<0.05
**p<0.01
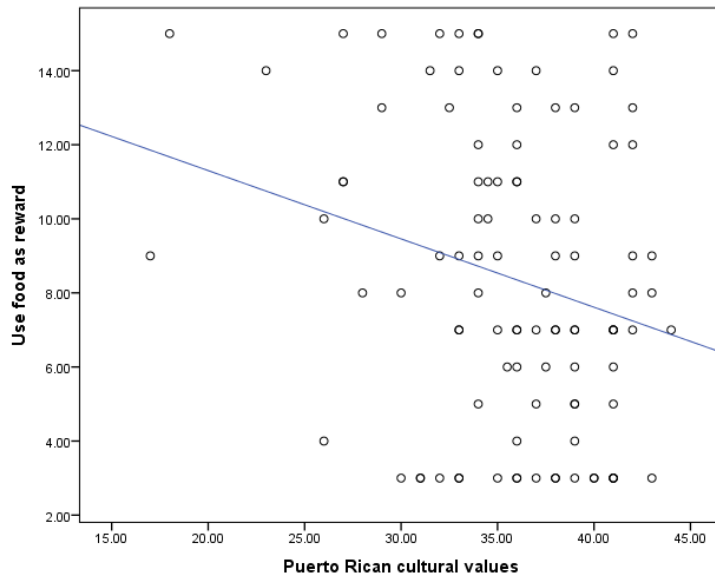
Figure 37. Negative correlation for mothers with Puerto Rican cultural dominance and maternal use of food as a reward.
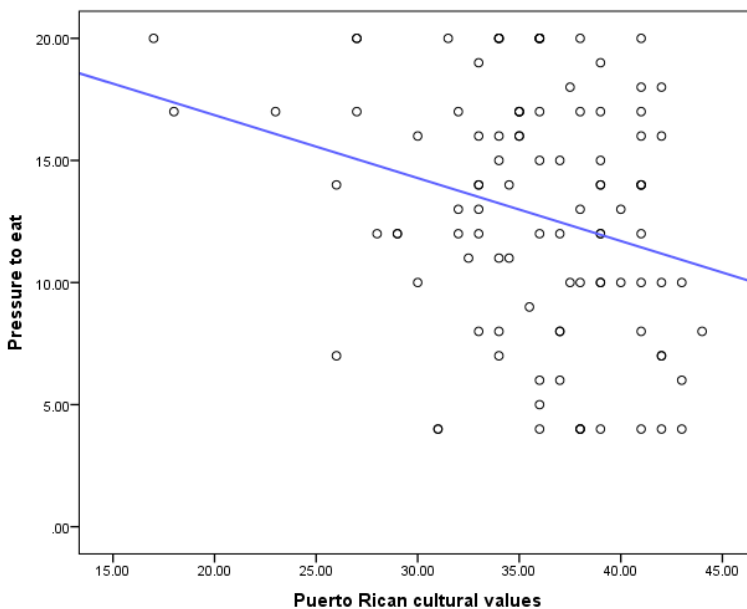
Figure 38. Negative correlation for mothers with Puerto Rican cultural dominance and maternal likelihood to pressure children to eat more food.
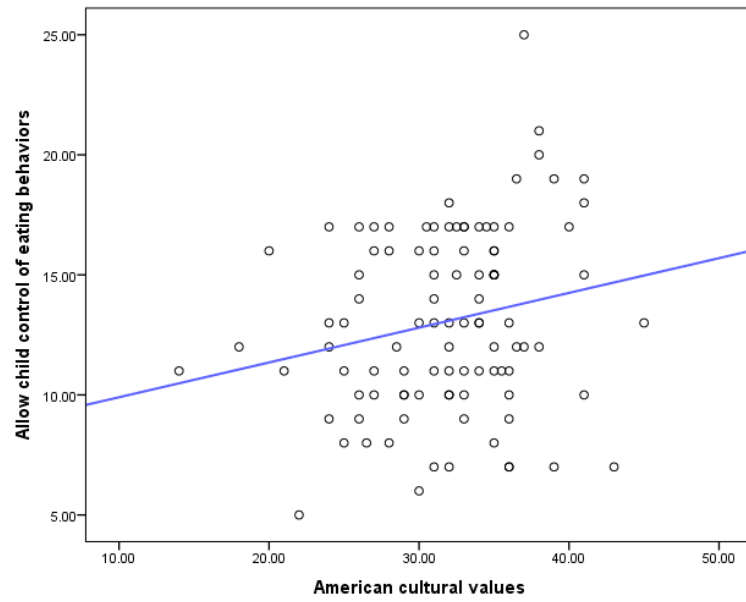
Figure 39. Positive correlation between the preference of American cultural values and mothers who allow children to control their eating behavior.
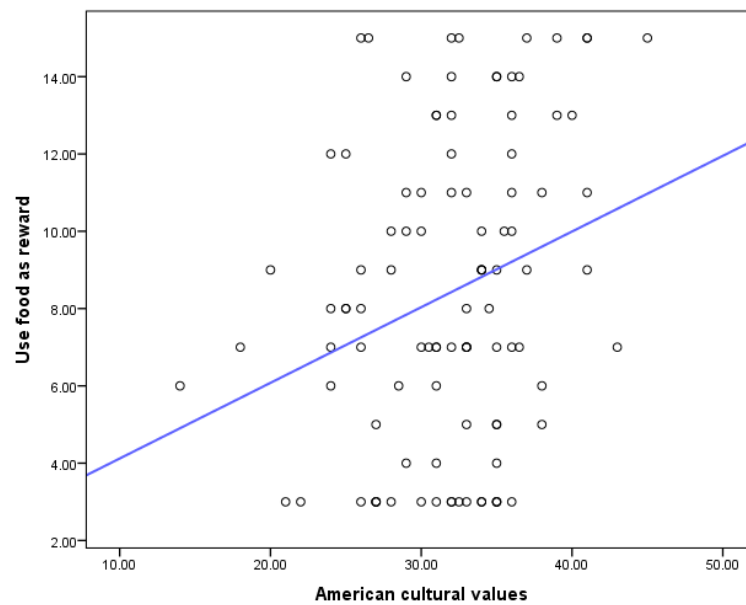
Figure 40. Positive correlation between American cultural dominance and maternal use of food as a reward.
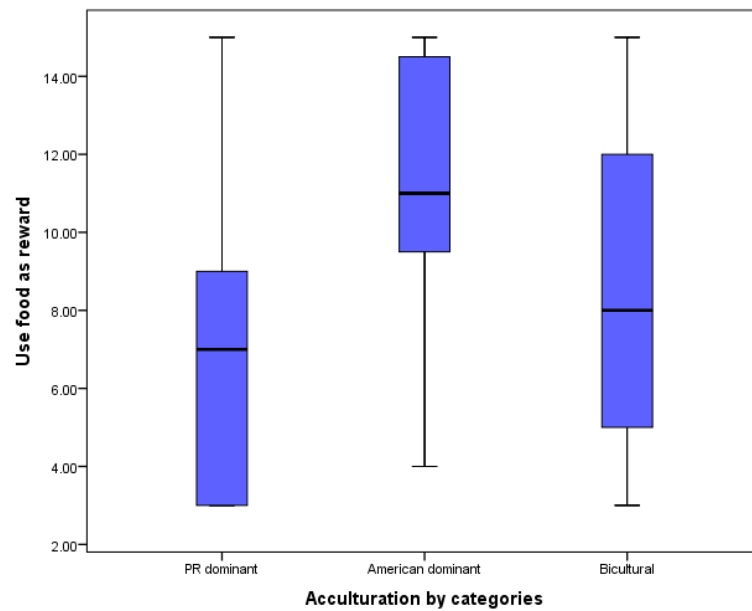
Figure 41. Association between maternal acculturation status and mothers who employ food as a reward.
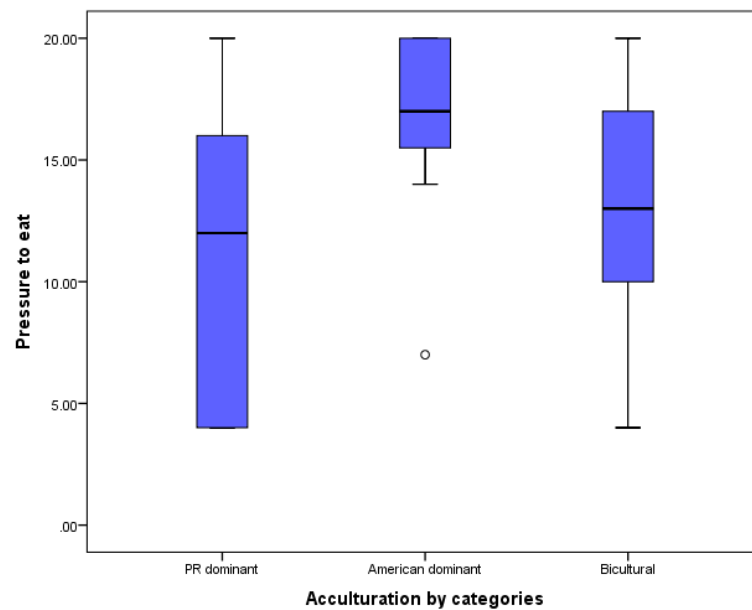
Figure 42. Relationship between a mother's level of acculturation and the practice of pressuring children to eat.
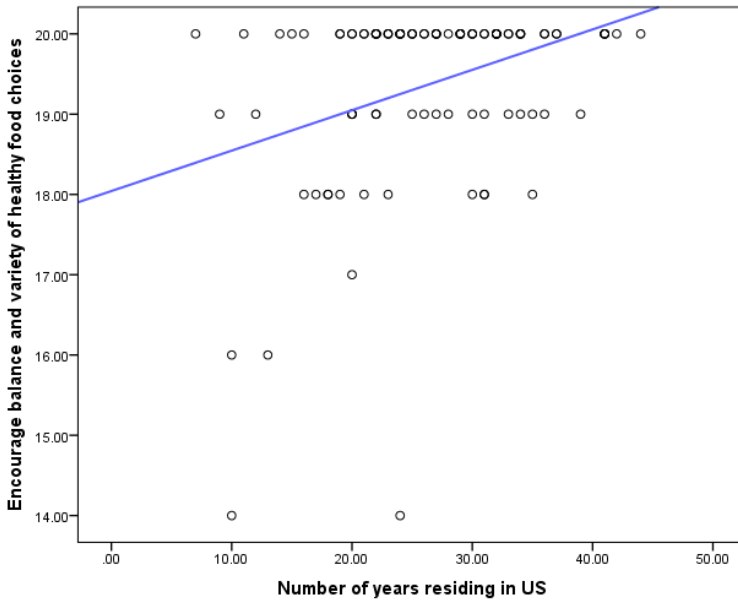
Figure 43. Positive correlation between the years a mother has resided in the United States and maternal encouragement for children to have a balanced diet.
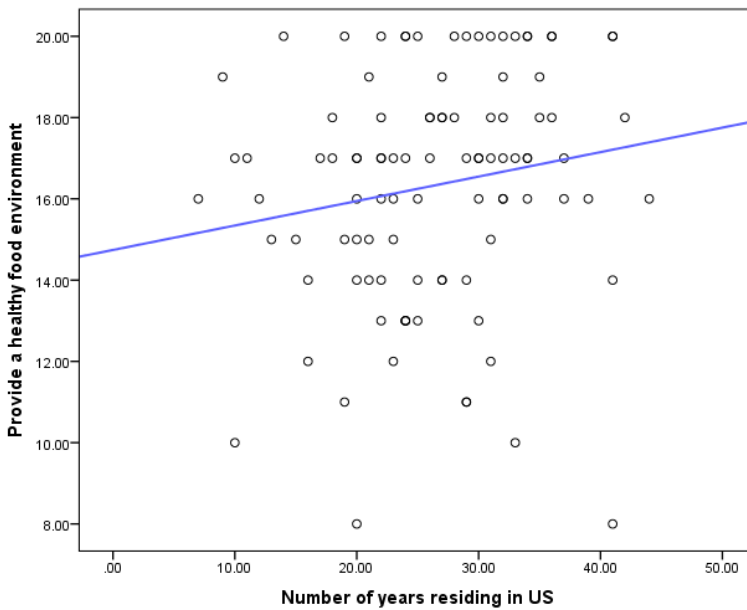
Figure 44. Positive correlation for maternal years of U.S. residence and mothers who provide a healthy food environment.
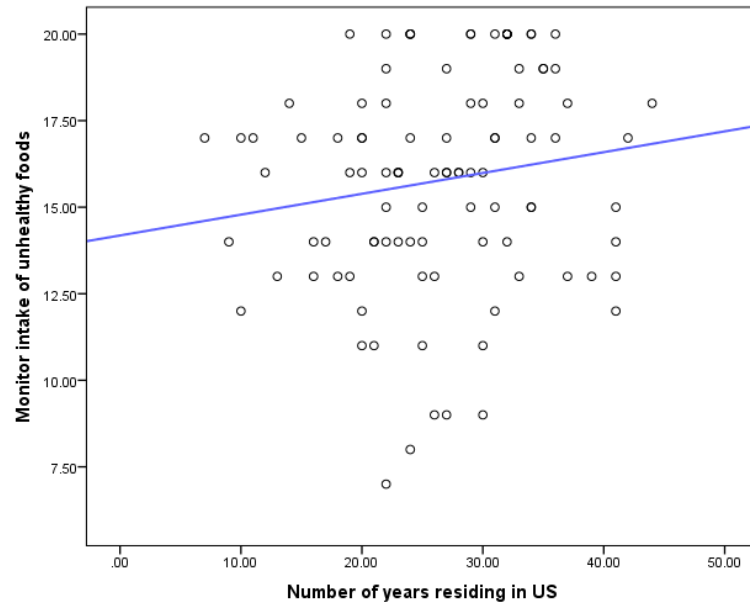
Figure 45. Positive correlation between maternal monitoring of unhealthy dietary intake and the number of years mothers have lived in the United States.
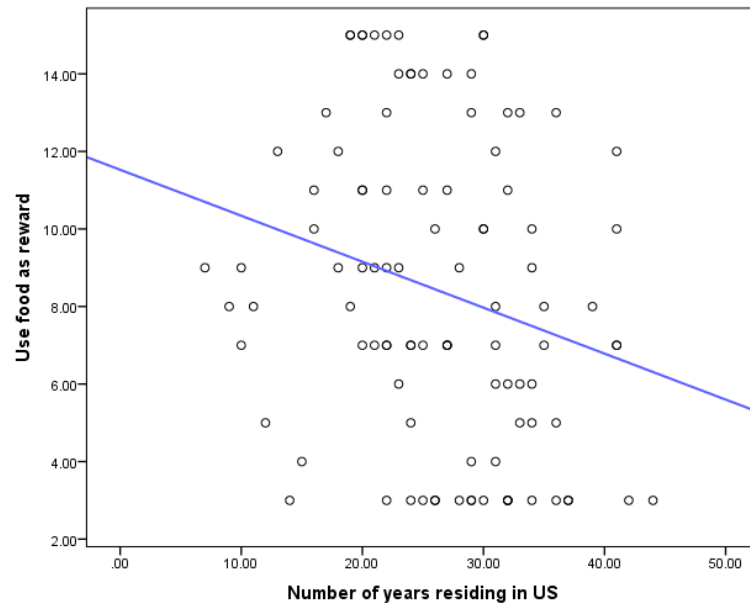
Figure 46. Negative correlation between maternal use of food as a reward mechanism and the number of years mothers have resided in the United States.

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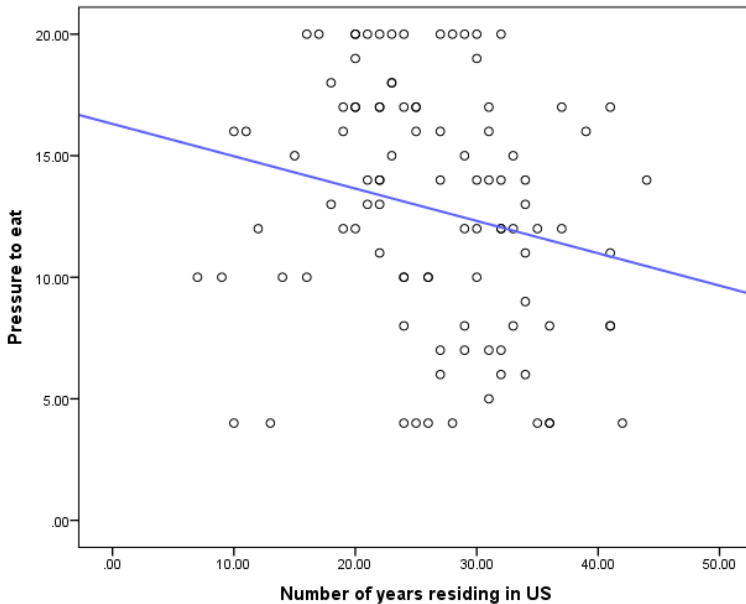
Figure 47. Negative correlation between maternal years of residence in the United Sates and maternal use of pressure to eat as a dietary child-feeding practice.

b. **Acculturation and child dietary intake**

Tables XXVIII and XXIX depict the results for comparisons between the acculturation variables and children's consumption of both healthy and unhealthy foods, snacks, and beverages based on the CHIS dietary intake. Again, daily dietary intake was measured continuously based on maternal report for all variables except consumption of fried potatoes, which was dichotomous. The Spearman rho correlation coefficient (r), Mann Whitney U, and Kruskal Wallis H tests were used to determine associations between the acculturation indicators and child dietary consumption.

Analyses determined that there was a positive moderate correlation between maternal Puerto Rican dominance and children who consumed juice (r=0.19, p=0.05). There was also a

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significant relationship for mothers who scored higher for Puerto Rican cultural values and children who consumed more fried potatoes (p=0.015). When observing scores for American dominance and dietary intake categories, the relationship for children's daily consumption of fried potatoes was also significant (p=0.039). In addition, there was a significant relationship between generational status and the daily consumption of sweetened beverages (p=0.035). No significant relationships were established between child dietary intake and biculturality, the level of acculturation, maternal place of birth, or the number of years of residence in the United States. Pictorial representations of significant findings are displayed below in Figures 48–51.

TABLE XXVIII

RELATIONSHIPS BETWEEN ACCULTURATION STATUS AND CHILD DIETARY INTAKE

Dietary Intake by group	Cultural Dominance		Biculturality			Acculturation Status			
	Puerto Rican-dominant n=100	American-dominant n=100	Bicultural =70	Not bicultural =30	p-value	Bicultural =70	American =8	Puerto Rican=22	p-value
Test	Spearman rho (r), p-value/ Mann Whitney U	Spearman rho (r), p-value/ Mann Whitney U	Mann Whitney U			Kruskal Wallis H (p-value)			
Juice (n=100)	r=0.19*, p=0.05	r=0.09, p=0.35	2(1,2)	2(1,3)	p=0.60	2(1,3)	2(1,4)	2(1,2)	p=0.79
Sweetened Beverages (n=100)	r=-0.06, p=0.55	r=-0.02, p=0.82	0(0,0)	0(0,1)	p=0.15	0(0,1)	0(0,1)	0(0,0)	p=0.33
Fruits (n=99)	r=0.06, p=0.53	r=0.10, p=0.33	1(1,2)	2(1,2)	p=0.12	2(1,2)	2(1,2)	1(1,2)	p=0.22
Vegetables (n=100)	r=0.16, p=0.12	r=-0.04, p=0.67	1(1,2)	1(0,1)	p=0.53	1(1,1)	1(0,1)	1(1,2)	p=0.37
Sweets (n=100)	r=0.00, p=0.98	r=-0.01, p=0.94	1(0,1)	1(0,2)	p=0.28	1(0,1)	1(0,2)	1(0,1)	p=0.44
Fried Potatoes (0=83, 1=17)	36(33,39) 39(36,42) p=0.02*	32(28,35) 35(31,36) p=0.04*	0(0,0)	0(0,0)	p=0.07	0(0,0)	-	0(0,0)	p=0.17
Fast Food (n=100)	r=0.05 p=0.66	r=0.10, p=0.33	1(1,2)	1(0,2)	p=0.88	1(1,1)	2(0,2)	1(1,2)	p=0.96

* p<0.05
** p<0.01

TABLE XXIX

RELATIONSHIPS BETWEEN ACCULTURATION PROXY MEASURES AND CHILD DIETARY INTAKE

Dietary Intake by group	Acculturation Measures						
	Nativity			Generational Status			U.S. Residence (years)
	United States	Puerto Rico	p-value	1st	2nd	p-value	
Test	Kruskal Wallis H			Mann Whitney U			Spearman rho (r)/ Mann Whitney U, p-value
Juice (n=100)	2(1,2)	2(1,3)	p=0.40	2(1,3)	2(1,2)	p=0.86	r=-0.03, p=0.80
Sweetened Beverages (n=100)	0(0,1)	0(0,0)	p=0.66	0(0,0)	0(0.1)	p=0.04*	r=-0.12, p=0.26
Fruits (n=99)	2(1,2)	1(1,2)	p=0.25	1(1,2)	2(1,2)	p=0.63	r=-0.03, p=0.80
Vegetables (n=100)	1(1,2)	1(0,1)	p=0.74	1(1,1)	1(0,2)	p=0.87	r=0.04, p=0.68
Sweets (n=100)	1(0,1)	1(1,1)	p=0.38	1(0,1)	1(1,2)	p=0.12	r=-0.09, p=0.36
Fried Potatoes (0=83, 1=17)	0(0,0)	0(0,0)	p=0.41	0(0,0)	0(0,0)	p=0.50	26(20,32) 27(23,32) p=0.68
Fast Food (n=100)	1(0,2)	1(1,2)	p=0.72	1(1,2)	1(0,2)	p=0.51	r=-0.11, p=0.30

* p<0.05
** p<0.01
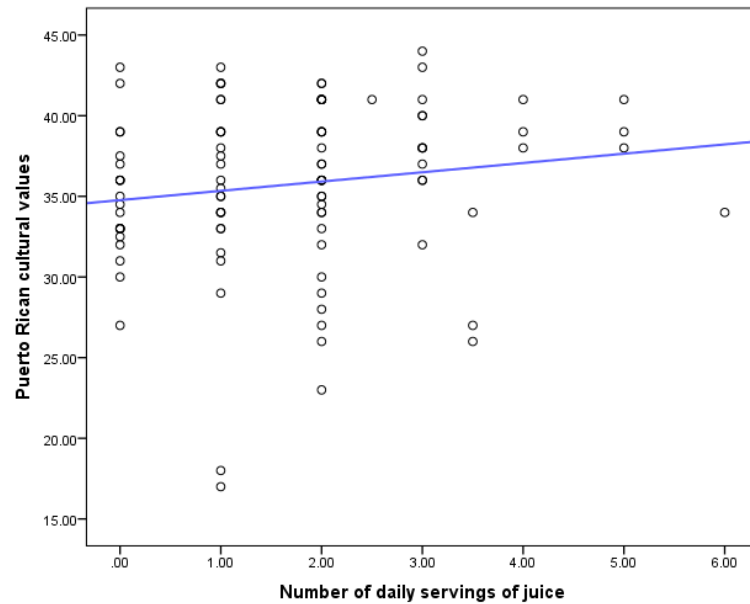
Figure 48. Positive correlation between maternal Puerto Rican cultural dominance and the daily number of juice servings a child consumes.
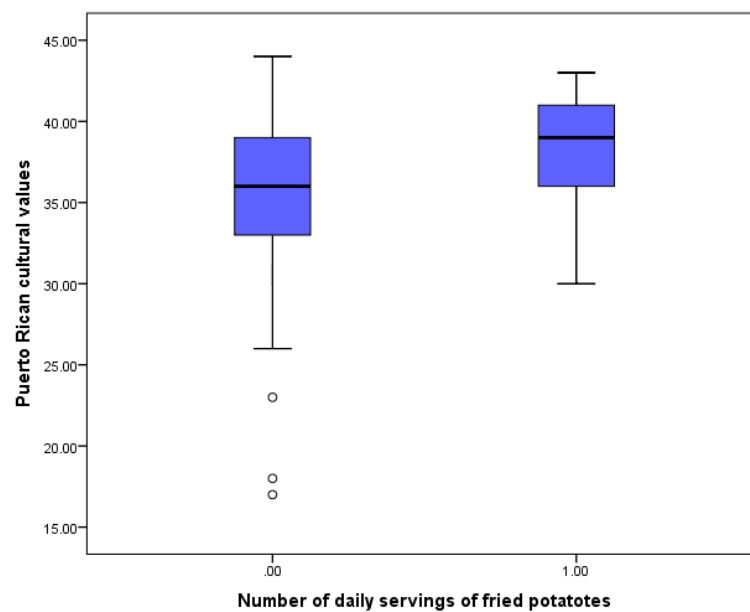
Figure 49. Relationship between Puerto Rican cultural dominance and children's daily intake of fried potatoes.
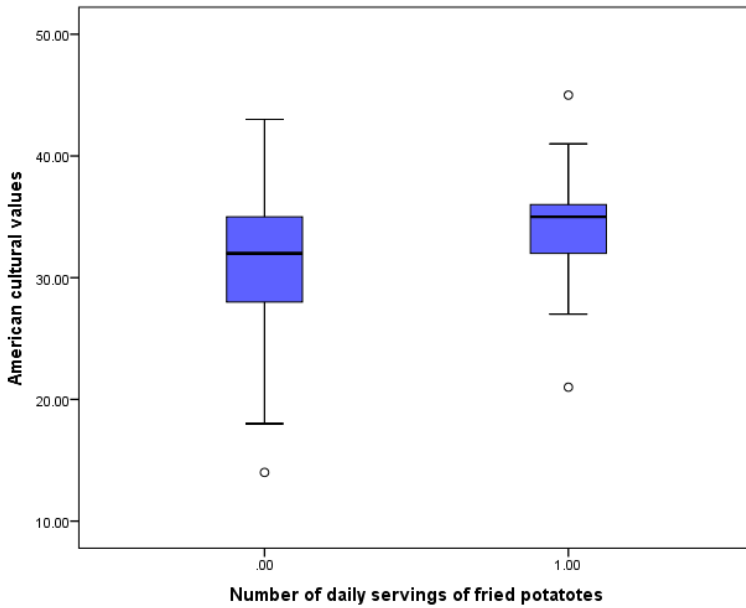
Figure 50. Association between American cultural dominance and the number of daily servings of fried potatoes a child eats.
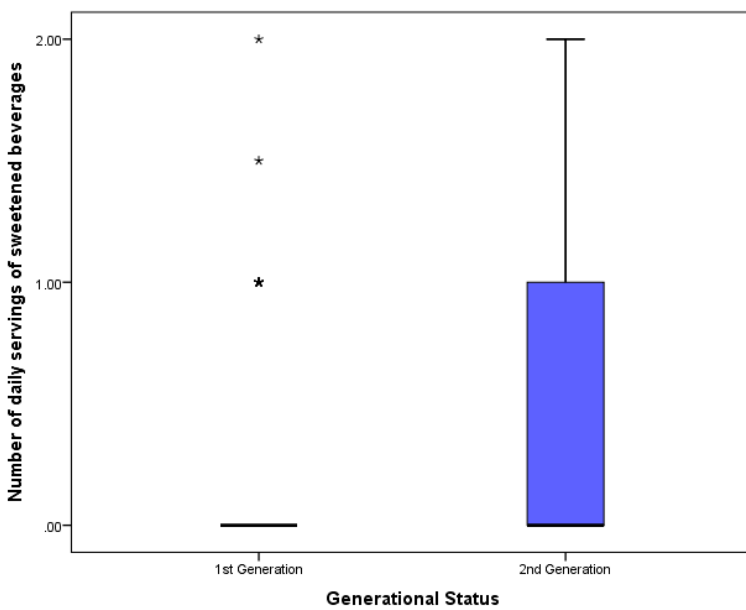
Figure 51. Relationship based on the daily number of servings of sweetened beverages by maternal generational status.

Acculturation and child anthropometric measures

Bivariate analyses were used to assess the relationship between child anthropometric measures and acculturation. First, child anthropometry was observed in relation to the BSPR domains of Puerto Rican and American cultural dominance. The Spearman rho correlation coefficient test was used to determine the relationship between child BMI and WC and the indicators of maternal acculturation: BSPR domains and years of residence in the United States. For the Puerto Rican cultural preference, there was no correlation for child BMI percentiles; however, there was a significant moderate positive relationship for child WC percentiles (r=0.23, p=0.024). For the American domain, there were no correlations established for child BMI or WC percentiles. Similarly, the length of residence in the United States was not correlated with child BMI or WC. The Mann Whitney U and Kruskal Wallis H tests were used to assess associations between child BMI and WC percentiles and biculturality, acculturation status, nativity, and generational status. The only significant relationship established for these analyses was between maternal acculturation and child WC (p=0.036). Findings from the analyses observing relationships between child anthropometric values and acculturation indicators appear in Tables XXX–XXXI. Figures 52 and 53 represent the significant relationships between child WC and maternal Puerto Rican dominance and acculturation status, respectively.

TABLE XXX

RELATIONSHIPS BETWEEN ACCULTURATION STATUS AND CHILD ANTHROPOMETRIC MEASURES

Anthropometric Measures	Acculturation Descriptors								
	Puerto Rican-dominant	American-dominant	Biculturality			Acculturation Status			
	n=100	n=100	Bicultural =70	Not bicultural =30	p-value	Bicultural= 70	American= 8	Puerto Rican= 22	p-value
Test	Spearman rho (r), p-value	Spearman rho (r), p-value	Mann Whitney U			Kruskal Wallis H (p-value)			
BMI Percentiles	r=0.08, p=0.45	r=-0.03, p=0.77	67(60,83)	75(61,93)	p=0.21	72(62,93)	82(44,93)	67(60,83)	p=0.44
WC Percentiles	r=0.23*, p=0.02	r=-0.19, p=0.06	5(4,5)	5(4,6)	p=0.16	5(5,6)	4(4,5)	5(4,5)	p=0.04*

* p<0.05
** p<0.01

TABLE XXXI

RELATIONSHIPS BETWEEN ACCULTURATION PROXY MEASURES AND CHILD ANTHROPOMETRIC MEASURES

Anthropometric Measures	Acculturation Descriptors						
	Nativity			Generational Status			U.S. Residence (years)
	United States=83	Puerto Rico=16	p-value	1st=66	2nd=34	p-value	n=100
Test	Kruskal Wallis H			Mann Whitney U			Spearman rho (r), p-value
BMI Percentiles	68(60,86)	74(38,92)	p=0.92	68(60,86)	70(61,90)	p=0.50	r=-0.09, p=0.40
WC Percentiles	5(4,5)	5(4,6)	p=0.56	5(4,5)	5(4,6)	p=0.36	r=-0.07, p=0.48

* $p<0.05$
** $p<0.01$
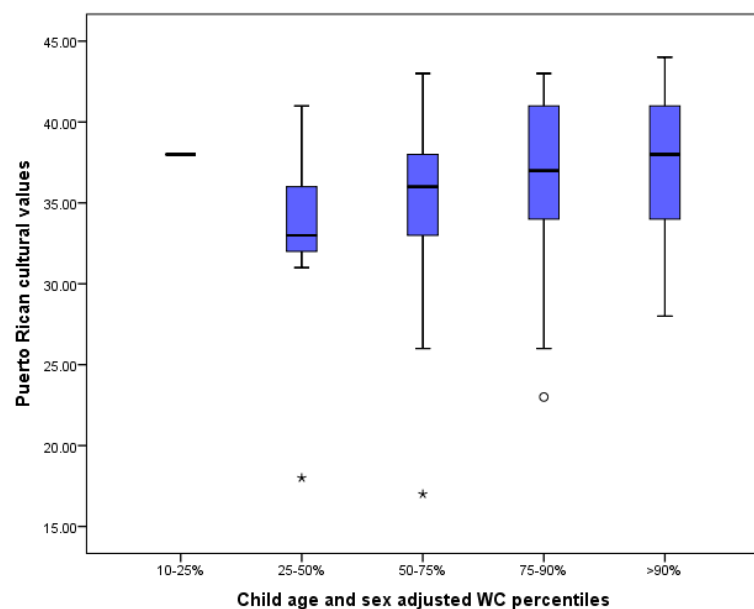
Figure 52. Positive correlation between Puerto Rican cultural dominance and child waist circumference.
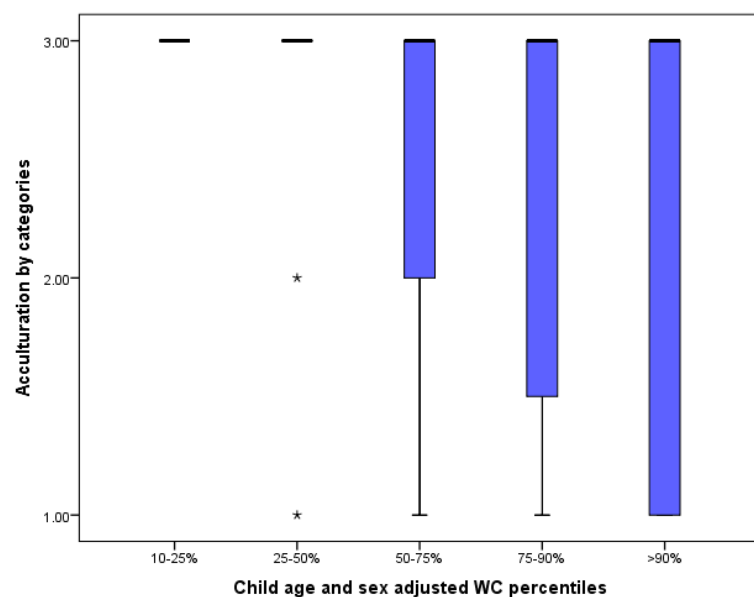
Figure 53. Association between maternal acculturation and child waist circumference.

4.   **Summary of bivariate findings**

Tables XXXII–XXXIV provide a summary of bivariate findings. Bivariate analyses were conducted to assess relationships between the CFPQ domains, acculturation, child-feeding characteristics, and anthropometric variables as well as demographic characteristics. For the CFPQ domains, analyses were conducted with child anthropometry, child-feeding characteristics, child dietary intake, and demographics. Findings determined that child control and pressure to eat were significantly related to child WC while only pressure to eat yielded a significant relationship to child BMI.

With regard to child-feeding characteristics, dietary balance and teaching about nutrition were significantly related to the number of family meals consumed daily. In addition, there was a statistical significance for mothers who receive assistance at home with child feeding and the practice of teaching about nutrition as well as using of food or drinks for emotional regulation. Relationships were also established between child dietary intake and several CFPQ domains. Daily consumption of sweetened beverages was associated with dietary balance, involving children in meal planning and preparation, providing a healthy food environment, monitoring dietary intake, and regulating children's emotional state with food. Daily intake of unhealthy sweet snacks was significantly related to dietary balance, monitoring dietary intake, and the use of food as a reward mechanism. Consumption of fruits was associated with the provision of a healthy food environment and juice intake was related to emotional regulation. There was also a positive significant relationship between the use of food as a reward mechanism and the number of daily servings of sweets eaten as well as the weekly servings of fast foods consumed, but negative relationship between rewarding and daily consumption of vegetables.

For maternal and child characteristics, annual family income and child age were associated with the involvement of children in meal planning and preparation. Maternal age was related to providing a healthy food environment, monitoring unhealthy foods, using foods as rewards, and pressuring to eat. The number of children per household was associated with the home food environment and the use of food for emotional regulation. In addition, there were significant relationships between child age and maternal employment of emotional regulation. Maternal education level and monitoring child dietary intake were also statistically significant.

Relationships for child anthropometry were assessed with child-feeding characteristics, child dietary intake, maternal anthropometry, child health status agreement, and demographic characteristics. Child WC was significantly associated with maternal WC. For child health status, tests of agreement were conducted between actual child anthropometric percentiles and maternal perception of child weight as well as maternal report of physician diagnosis of child weight status. The tests revealed strong agreement between maternal report of physician assessment and actual child weight status. With regard to demographic characteristics, child BMI was associated with the child's sex. Child WC was correlated with the number of children per household and related to the presence of older siblings.

For acculturation status, relationships between the CFPQ domains, child dietary intake, and child anthropometry were observed. With regard to the CFPQ domains, the number of years U.S. residence were significantly associated with maternal encouragement of a balanced diet, provision of a healthy dietary environment, monitoring the consumption of unhealthy foods, the use of food to reward children for good behavior, and pressuring children to eat more food. Puerto Rican cultural dominance was associated with the use of food as reward and pressure to eat. Maternal acculturation status was related to rewarding behavior with food and pressuring to

eat. There was also an association between American cultural dominance and rewarding children with food as well as child control of dietary intake. Analyses between acculturation and dietary intake revealed a significant relationship between Puerto Rican cultural preference and daily intake of juice and fried potatoes. American cultural dominance was also related to the number of servings of fried potatoes eaten daily. Child daily consumption of sweetened beverages was associated with maternal generational status. With regard to child anthropometric indices, WC was significantly related to Puerto Rican cultural dominance as well as the mothers' acculturation status.

TABLE XXXII

SUMMARY OF BIVARIATE FINDINGS FOR SPECIFIC AIM 1

Specific Aim 1	Child-feeding practices and: (a) child anthropometry, (b) child-feeding characteristics, and (c) maternal and child characteristics			
CFPQ Domains	Child Anthropometry	Feeding Characteristics	Dietary Intake	Demographic Characteristics
Control	WC			
Balance		Number of family meals	Sweetened beverages, Sweets	
Involve			Sweetened beverages	Annual income, Child age
Environment			Sweetened beverages, Fruit	Maternal age, Number of children per household
Teach		Number of family meals, Assistance with child feeding		
Monitor			Sweetened beverages, Sweets	Maternal age, Maternal education
Regulation		Assistance with child feeding	Sweetened beverages, Juice	Child age, Number of children per household
Reward			Vegetables, Sweets, Fast food	Maternal age
Pressure	WC, BMI			Maternal age

TABLE XXXIII

SUMMARY OF BIVARIATE FINDINGS FOR SPECIFIC AIM 2

Specific Aim 2	Child anthropometry and: (a) child-feeding characteristics, (b) maternal anthropometry, and (c) maternal and child characteristics.		
Child Anthropometry	Child-feeding Characteristics	Maternal Anthropometry	Demographic Characteristics
BMI			Child's sex
WC		WC	Number of children per household, Presence of older siblings

TABLE XXXIV

SUMMARY OF BIVARIATE FINDINGS FOR SPECIFIC AIM 3

Specific Aim 3	Acculturation and: (a) child-feeding characteristics, (b) maternal anthropometry, and (c) maternal and child characteristics		
Acculturation	CFPQ Domains	Child Dietary Intake	Child Anthropometry
PR Dominance	Reward, Pressure	Dietary intake	WC
American Dominance	Control, Reward	Juice, Fried potatoes	
Biculturality		Fried potatoes	
Acculturation Status	Reward, Pressure		WC
Nativity			
Generational Status		Sweetened beverages	
Years of U.S. Residence	Balance, Environment, Monitor, Reward, Pressure		

H.   **Multivariate Results**

This section will use multivariate analyses to examine interrelationships between the child-feeding practices employed by the participating Puerto Rican mothers in relation to maternal acculturation and the child's dietary intake and anthropometry. Due to the non-normality of child BMI and WC percentiles, multiple logistic regression models were conducted to explore the research question: Does acculturation moderate the relationship between maternal child-feeding practices or child dietary intake and child anthropometric measures (BMI and WC)? Analyses were performed using SAS v. 9.2.

1.   **Body mass index**

The BMI percentiles were dichotomized as overweight or obese children being at or above the 85th percentile and not overweight or obese being below the 85th percentile. To predict child overweight based on BMI as a function of child-feeding practices, twelve different univariate models were fit (i.e., one for each of the twelve CFPQ domains). Among the CFPQ domains only restriction for weight (i.e., maternal restriction of calorie-dense foods to control child weight) significantly predicted child overweight. After adjusting for restriction for weight, no other CFPQ domain was predictive of child overweight status. Furthermore, after adjusting for maternal and child characteristics (i.e., maternal age, employment and education status, maternal BMI, and child's sex), the effect of restriction for weight remained the only significant CFPQ predictor of child overweight. Demographic factors were selected a priori and were limited due to sample size. For example, maternal income was not included in the analyses because it was correlated with employment and education. Child and maternal WC were also

excluded when overweight was defined by BMI. Model 1 tested the full model including the five aforementioned demographic characteristics, restriction for weight, and child BMI.

Model 2 examined the moderating effect of acculturation on the relationship between restriction for weight and child overweight. Models were no longer adjusted for maternal and child characteristics as those did not significantly impact the odds of child overweight. There was no moderating effect of acculturation on the relationship of restriction for weight (i.e., maternal restriction of child consumption of calorie-dense food to control weight) and child overweight (p=0.095). Model 3 was fit to examine the main effects of acculturation and restriction for weight. After adjusting for restriction for weight, there was no additive effect of acculturation (p=0.268). Therefore, acculturation did not modify the effect of restriction for weight control on child overweight status when BMI was used. Tables XXXV and XXXVI display odds ratios (ORs) and 95% confidence intervals (CIs) for the univariate models and the main effects of restriction for weight.

TABLE XXXV

LOGISTIC REGRESSION ANALYSIS OF CHILD OVERWEIGHT STATUS BASED ON
BODY MASS INDEX AS A FUNCTION OF CHILD-FEEDING DOMAINS (N=100) –
UNIVARIATE MODELS

Predictors	Univariate (12 Models)		
	ORs	95% CI	C-statistic
Restriction for Weight	1.09	(1.01, 1.17)*	0.639
Restriction for Health	1.13	(0.99, 1.29)	0.612
Pressure	0.93	(0.85, 1.02)	0.606
Child Control	1.09	(0.97, 1.22)	0.592
Reward	1.08	(0.96, 1.20)	0.591
Environment	0.89	(0.77, 1.04)	0.590
Involve	0.89	(0.78, 1.02)	0.585
Monitoring	1.05	(0.91, 1.21)	0.549
Emotional Regulation	1.06	(0.85, 1.32)	0.546
Modeling	0.97	(0.84, 1.12)	0.545
Balance	0.95	(0.66, 1.37)	0.529
Teaching	0.98	(0.81, 1.18)	0.511

* $p<0.05$

** $p<0.01$

TABLE XXXVI

LOGISTIC REGRESSION ANALYSIS OF CHILD OVERWEIGHT STATUS BASED ON BODY MASS INDEX AS A FUNCTION OF CHILD-FEEDING DOMAINS (N=100)—MODELS 1, 2, AND 3

Predictors	ORs (95% CI)		
	Model 1	Model 2	Model 3
Restriction for Weight	1.12 (1.03, 1.21)	ǂ	1.09 (1.02, 1.17)
Restriction for Health			
Pressure			
Child Control			
Reward			
Environment			
Involve			
Monitoring			
Emotional Regulation			
Modeling			
Balance			
Teaching			
Maternal Age	0.92 (0.85, 1.00)		
Maternal Education	1.68 (0.56, 4.99)		
Maternal Employment	0.75 (0.25, 2.24)		
Maternal BMI	1.00 (0.93, 1.08)		
Child's Sex	0.66 (0.25, 1.74)		
Acculturation (χ^2(2) p-value)			*0.268*
Bicultural		ǂ	(ref)
Puerto Rican-dominant		ǂ	1.31 (0.44, 3.90)
American-dominant		ǂ	3.55 (0.76, 16.56)
*RWT*Acculturation (χ^2(2) p-value)*		*0.095*	
Bicultural		1.11 (1.02, 1.21)	
Puerto Rican-dominant		1.17 (0.98, 1.39)	
American-dominant		0.73 (0.50, 1.08)	

* p<0.05, ** p<0.01

ǂ Model 2 contains main effects of restriction for weight (RWT), acculturation, and the interaction. Odds Ratios shown are for RWT at each level of acculturation (comparative to OR for RWT).

Among the dietary intake variables, only consumption of sweets predicted child overweight and after adjusting for sweets, no other dietary intake measure increased prediction. Similar to restriction for weight, after adjusting for maternal and child characteristics, only sweets remained a significant predictor of child overweight. Model 1 assessed the full model including demographic characteristics, sweets, and child BMI.

Next, the moderating effects of acculturation on the relationship between sweets and child overweight were examined. Models were no longer adjusted for demographic characteristics as those had no significant impact on the odds of child overweight. There was no moderating effect of acculturation on the effect of sweets and child overweight (p=0.985). Model 3 was fit to examine the main effects of acculturation and restriction for weight. Furthermore, after adjusting for sweets, acculturation did not improve the prediction of overweight (p=0.519). Therefore, acculturation did not modify the effect of sweets on child overweight status when BMI was used. The ORs and 95% CIs for the univariate models and the main effects of sweets appear in Tables XXXVII and XXXVIII.

A final model was fit incorporating sweets, restriction for weight, and acculturation. Results were consistent with the two models presented above: OR for sweets 2.15 (1.12, 4.11), OR for restriction for weight 1.10 (1.02, 1.108), and no increase in odds by acculturation for Puerto Rican-dominant OR 1.14 (0.36, 3.60) and for American-dominant OR 2.70 (0.55, 13.23).

TABLE XXXVII

LOGISTIC REGRESSION ANALYSIS OF CHILD OVERWEIGHT STATUS BASED ON
BODY MASS INDEX AS A FUNCTION OF DIETARY INTAKE (N = 100)—
UNIVARIATE MODELS

Predictors	Univariate (6 Models)		
	ORs	95% CI	C-statistic
Sweets	2.11	(1.18, 3.75)*	0.637
Fruit	0.67	(0.42, 1.05)	0.626
Juice	1.25	(0.90, 1.73)	0.611
Sweetened Beverages	1.40	(0.61, 3.22)	0.531
Fried Potatoes	0.76	(0.22, 2.55)	0.519
Vegetables	1.05	(0.65, 1.69)	0.510

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

TABLE XXXVIII

LOGISTIC REGRESSION ANALYSIS OF CHILD OVERWEIGHT STATUS BASED ON BODY MASS INDEX AS A FUNCTION OF DIETARY INTAKE (N = 100)— MODELS 1, 2, AND 3

Predictors	ORs (95% CI)		
	Model 1	Model 2	Model 3
Sweets	2.16 (1.17, 3.98)	‡	2.01 (1.12, 3.62)
Fruit			
Juice			
Sweetened Beverages			
Fried Potatoes			
Vegetables			
Maternal Age	0.96 (0.89, 1.04)		
Maternal Education	1.30 (0.46, 3.71)		
Maternal Employment	0.86 (0.30, 2.48)		
Maternal BMI	0.99 (0.92, 1.07)		
Child's Sex	0.48 (0.18, 1.29)		
Acculturation (χ^2(2) p-value)			*0.519*
Bicultural		‡	(ref)
Puerto Rican-dominant		‡	1.25 (0.42, 3.78)
American-dominant		‡	2.47 (0.51, 11.86)
Sweets*Acculturation (χ^2(2) p-value)		*0.985*	
Bicultural		0.86 (0.39, 1.89)	
Puerto Rican-dominant		>99 (<0.01, >99)	
American-dominant		>99 (<0.01, >99)	

* $p<0.05$, ** $p<0.01$

‡ Model 2 contains main effects of sweets, acculturation, and the interaction. Odds Ratios shown are for sweets at each level of acculturation (comparative to OR for Sweets).

2.   **Waist circumference**

Children with a WC in the 75th percentile or greater were considered to be overweight in comparison to children with a WC less than the 75th percentile. Twelve different univariate models were fit (i.e., one for each of the twelve CFPQ domains) in order to predict child overweight based on WC as a function of child-feeding practices. Only child control (i.e., mothers who allow children control over eating behaviors and food intake) was significantly predictive of child overweight, and after adjusting for child control no other maternal child-feeding practice domain was predictive. Similar to BMI thresholds of overweight, adjusting for maternal and child characteristics did not impact the odds of WC overweight status of child control feeding practices. Maternal and child characteristics did not predict WC overweight, and hence were not included in analyses examining moderating effects of acculturation. As previously noted, maternal and child characteristics were selected a priori and were limited due to sample size. Child and maternal BMI were also not included when overweight was defined by WC. The full model including the selected demographic characteristics, child control, and child WC appear in Model 1.

Model 2 assessed the moderating effect of acculturation on the relationship between child control and child overweight. Models were no longer adjusted for maternal and child characteristics as those did not significantly impact the odds of child overweight. There was no moderating effect of acculturation on child control and WC at or above the 75th percentile (p=0.540). Model 3 was fit to examine the main effects of acculturation and child control. After adjusting for child control, there was an additive effect of acculturation for child overweight (p=0.034). Therefore, acculturation was an additive predictor for the effect of child control on child overweight status when WC was used. Tables XXXIX and XL provide ORs and 95% CIs for the univariate models and each of the significant main effects.

To predict child overweight based on WC as a function of child dietary intake, six different univariate models were fit for each of the dietary indicators. Among the measures of child dietary intake, none of the categories were predictive of child overweight defined by WC percentiles. Therefore, no further analyses were conducted.

TABLE XXXIX

LOGISTIC REGRESSION ANALYSIS OF CHILD OVERWEIGHT STATUS BASED ON WAIST CIRCUMFERENCE AS A FUNCTION OF CHILD-FEEDING DOMAINS (N=100)—UNIVARIATE MODELS

Predictors	Univariate (12 Models)		
	ORs	95% CI	C-statistic
Child Control	1.16	(1.03, 1.30)**	0.646
Emotional Regulation	1.23	(0.97, 1.57)	0.608
Pressure	0.94	(0.86, 1.02)	0.598
Restriction for Weight	1.06	(0.99, 1.14)	0.593
Monitoring	1.09	(0.96, 1.24)	0.584
Modeling	1.10	(0.96, 1.27)	0.582
Teaching	1.07	(0.90, 1.27)	0.562
Restriction for Health	1.07	(0.97, 1.18)	0.554
Environment	0.98	(0.85, 1.13)	0.513
Balance	1.03	(0.73, 1.44)	0.512
Involve	0.99	(0.87, 1.12)	0.503
Reward	1.00	(0.90, 1.10)	0.493

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

TABLE XL

LOGISTIC REGRESSION ANALYSIS OF CHILD OVERWEIGHT STATUS BASED ON WAIST CIRCUMFERENCE AS A FUNCTION OF CHILD-FEEDING DOMAINS (N=100)—MODELS 1, 2, AND 3

Predictors	ORs (95% CI)		
	Model 1	Model 2	Model 3
Child Control	1.17 (1.04, 1.32)	ǂ	1.19 (1.06, 1.35)
Emotional Regulation			
Pressure			
Restriction for Weight			
Monitoring			
Modeling			
Teaching			
Restriction for Health			
Environment			
Balance			
Involve			
Reward			
Maternal Age	0.98 (0.91, 1.05)		
Maternal Education	1.54 (0.57, 4.18)		
Maternal Employment	1.90 (0.69, 5.21)		
Maternal WC	1.02 (0.99, 1.05)		
Child's Sex	0.67 (0.28, 1.56)		
Acculturation (χ^2(2) p-value)			*0.034*
Bicultural		ǂ	(ref)
Puerto Rican-dominant		ǂ	4.17 (1.30, 13.41)*
American-dominant		ǂ	0.58 (0.12, 2.82)
Control*Acculturation (χ^2(2) p-value)		*0.540*	
Bicultural		1.16 (1.02, 1.33)	
Puerto Rican-dominant		1.52 (0.96, 2.40)	
American-dominant		1.14 (0.75, 1.74)	

* p<0.05, ** p<0.01

ǂ Model 2 contains main effects of control, acculturation, and the interaction. Odds Ratios shown are for control at each level of acculturation (comparative to OR for Control).

3. **<u>Summary of multivariate findings</u>**

Regression analyses determined that restriction for weight was the strongest predictor of child overweight using BMI percentiles while child control was the strongest predictor of child overweight using WC percentiles. Of the health-promoting CFPQ domains, only child control was predictive of child overweight (WC) while restriction for weight was the only health-compromising predictor of child overweight (BMI). Although acculturation was a significant predictor of child overweight for BMI and WC percentiles, acculturation did not modify the relationship between maternal child-feeding practices and child overweight and may or may not be an additive predictor of overweight depending on the metric used. In addition, the daily dietary intake of sweets did predict child overweight defined by BMI, but acculturation did not moderate this relationship. Table XLI provides a summary of the multivariate findings.

TABLE XLI

SUMMARY OF SIGNIFICANT MULTIVARIATE FINDINGS

Child Anthropometry Measures	CFPQ Domains	Child Dietary Intake	Acculturation
BMI	Restriction for weight	Sweets	
WC	Child control		Acculturation

V. DISCUSSION

The purpose of this study was to identity the maternal child-feeding behaviors that may contribute to obesity prevention or development among Puerto Rican children. This investigation also sought to uncover information to develop future obesity prevention intervention programs tailored to Puerto Rican populations. This chapter discusses the results presented in Chapter IV on the role of maternal child-feeding practices in the relationship between child anthropometric measures and maternal acculturation. The chapter first reviews results from descriptive information on the primary study variables: maternal child-feeding practices, child dietary intake, anthropometry, and acculturation. Then, the chapter discusses findings based on each of the three primary research aims. Next, results from multivariate analyses examining acculturation as a moderator of child-feeding practices and child anthropometry are reviewed. Then, the findings are discussed in relation to the conceptual model. The chapter also provides a summary of the key findings. Then, the study limitations, strengths, and contributions are described. Research implications are presented in order to guide next steps in expanding this pilot project to a full-scale study. Community implications are examined within the context of the health status of Puerto Rican children. Implications for clinicians and public health practitioners are also introduced as opportunities for developing future culturally appropriate interventions. The chapter ends with concluding remarks.

A.   <u>**Maternal Child-feeding Practices**</u>

The CFPQ was used to assess maternal-feeding strategies (Musher-Eizenman & Holub, 2007). Although much of the extant literature observing child-feeding practices is centered on coercive, deficit-based, health-compromising strategies (Birch, Fisher, & Davison, 2003; Faith et

al., 2004; Hughes et al., 2006), the CFPQ instrument used in this study is a comprehensive instrument with twelve child-feeding domains capturing child-feeding practices that are both health-promoting (allow child control over dietary practices, encourage dietary balance and variety, involve in meal planning and preparation, model healthy eating, provide healthy environment, teach about nutrition); and health-compromising (monitor intake of unhealthy foods, use food for emotional regulation, use food as reward, pressure to eat, restrict food intake for health concerns, restrict dietary consumption for weight concerns).

Based on the composite scores for the CFPQ domains, it was determined that Puerto Rican women in Chicago are more likely to report practicing CC, health-promoting feeding strategies in comparison to PC, health-compromising practices. The study participants agreed with regularly using most of the healthy feeding tactics including balance and variety, involvement, modeling, environment, and teaching. Contrary to existing research with Latino samples, these Puerto Rican mothers were also not as likely to use coercive, PC practices to encourage their children to eat, which counter the child's ability to self-regulate and may contribute to childhood overweight (Faith et al., 2003; Hughes et al., 2005). Namely, the women in this study did not report manipulating their children's food intake for emotional regulation, rewards, restriction for weight, or pressure to eat. These practices suggest that Puerto Rican mothers employ practices that support a healthy dietary environment and promote childhood overweight prevention.

Conversely, it is important to note feeding practices among the study participants that may be counterproductive to the health and well-being of their children. For example, these Puerto Rican women were also likely to regularly engage in the risky PC feeding strategy of monitoring as well as restriction for health, which have been found to reinforce the child's desire

for the "restricted" foods (Sherry et al., 2004) and increase the overeating and overweight risk (Faith et al., 2003). Similarly, most of the participants disagreed with the routine promotion of child control, a healthy CC practice that promotes child self-regulation.

Findings from this study were consistent with the CFPQ research developed by Musher-Eizenman and Holub (2007), conducted on predominantly Caucasian middle-class women; however, there was discordance with the practice of providing a healthy food environment and restricting food for health concerns where these Puerto Rican women emphasized employing each of these strategies more prevalently. This may also support literature by Hughes and colleagues (2005) that claims that Latinas are more likely to practice CC strategies compared to their African American and Euro-American counterparts (Hughes et al., 2006); however, further research would be necessary to determine whether a comparative analysis of mothers of Puerto Rican descent as well as other racial and ethnic groups would yield similar findings.

Nonetheless, the women in the study practiced a variety of both healthy and risky feeding strategies routinely. This may be reflective of evidence that Latino parents are more likely to practice a balance of both authoritarian and permissive parenting styles. In other words, Latina mothers may employ authoritarian strategies that are coercive to exert control on child dietary intake (e.g., restriction) and oppose child control of self-regulation while also nurturing healthy habits (e.g., provision of a healthy environment and involvement in meal planning) (Berk, 2008; Faith et al., 2003; Hughes et al., 2005). According to Berk (2008), authoritarian practices can be buffered by permissive tactics and support child autonomy in developing healthy child-eating habits. Furthermore, Latino parenting styles that combine supportive CC strategies with high-control PC strategies have been demonstrated to have protective effects (Berk, 2008).

B.   **Child Dietary Intake**

Dietary intake of young children is important as it establishes a foundation for lifelong dietary habits. The consumption of both healthy and unhealthy beverages, snacks, and meals was captured using the CHIS 7-item child dietary intake inventory. Sweetened beverages including 100% fruit juice are sources of high-energy, low-nutrient-dense beverages noted as probable contributors to the prevalence of early childhood obesity (U.S. Department of Health and Human Services [USDHHS], 2005). Maternal report revealed that most Puerto Rican preschool children in HP consume 2.0 cups of 100% juice daily. Similarly, the 2006 HPCHS established that Puerto Rican children two to twelve years of age drank about 1.5 servings of 100% juice a day (Estarziau & et al., 2006). Thus, the daily juice intake by Puerto Rican children exceeds the 2001 dietary recommendations made by the AAP for children ages one to six years to consume no more than 4.0–6.0 ounces daily (AAP, 2001). The USDA 2005 Dietary Guidelines support the indicated servings by the AAP to limit daily intake to a maximum of 4.0–6.0 ounces (USDA & USDHHS, 2005). This suggests that Puerto Rican children may be at an increased risk of overconsumption of fruit juice that may potentially contribute to excess energy and hence overweight. In addition, researchers have found a positive relationship between 100% fruit juice and a greater prevalence of overweight among preschool children consuming up to 12.0 ounces daily (Melgar-Quiñonez & Kaiser, 2004), which may vary by the type of juice (Dennison et al., 1999). However, consistent with the HPCHS findings, the majority of the children did not drink sweetened beverages (e.g., soda, fruit punch, and Gatorade). Therefore, while young Puerto Rican children may consume four times above the desired amount of daily allotted fruit juice, the low intake of sweetened drinks may reduce the impact of this effect. Nonetheless, it is important to note that while the Academy of Nutrition and Dietetics does not have specific

recommendations for the intake of fruit juice, they do recommend for children to limit their beverage options to water and milk. Similarly, the 2010 Dietary Guidelines encourage replacing sweetened beverages with water and unsweetened drinks along with recommended daily amounts of nutrient-rich low-fat or fat-free milk and 100% fruit juice (USDA & USDHHS, 2010).

Fruits and vegetables are recognized as a protective source of nutrition for preventing child overweight. Most of the mothers in the study reported that their children ate nearly three servings of fruits and vegetables on a daily basis. Similarly, the HPCHS study revealed that Puerto Rican children had about three servings of fruit and vegetables a day. However, the USDA Dietary Guidelines and the Consortium to Lower Obesity in Chicago Children (CLOCC) 5-4-3-2-1 Go! campaign recommend daily consumption of five servings of fruits and vegetables. This suggests that children in HP are below the dietary recommendations, which may potentially place them at risk of obesity and obesity-related disease risk. Evidence-based research indicates that children consuming fewer fruits and vegetables had lower intakes of micronutrients (e.g., vitamins A and C) and dietary fiber as well as higher fat intake (Dennison et al., 1997), which may increase long-term obesity risk (He et al., 2004) and other related comorbidities (Nicklas et al., 2009), such as stroke and CVD (Bazzano et al., 2002). Interventions targeting an increase of fruit and vegetable consumption have been found to decrease childhood overweight and obesity among children who eat more fruits and vegetables (Veugelers & Fitzgerald, 2005). However, others have not been successful in finding associations between child BMI as a measure of overweight and dietary intake of fruit and vegetable intake (Field et al., 2003). In addition, these Puerto Rican children only consumed about one daily serving of sweet snacks (e.g., cookies, candy, pastries, and ice cream). On average, the children did not consume fried potatoes (e.g.,

french fries, hash browns, and home fries), but they did consume approximately one fast food

meal a week. These findings were comparable with those from the HPCHS. Because these foods

are considered to be low-nutrient and calorie-dense, the USDA cautions to eat these sparingly.

Thus, the low consumption of sweets, fried potatoes, and fast foods would suggest that Puerto

Rican mothers promote healthy dietary habits by either limiting the purchase of these products or

monitoring their children's intake.

C.   **Anthropometry**

This study measured children's and mother's weight, height, and WC. Participant BMI

calculations were in kg/m^2 with child BMI adjusted for age and sex. Waist circumference was

measured in centimeters. Based on BMI percentiles, most Puerto Rican boys and girls were of

normal weight status (76% and 67%, respectively); however, girls (33%) were more likely to be

overweight or obese than boys (22%). Conversely, WC percentiles revealed a higher overweight

and obesity risk for both boys (51%) and girls (62%), with girls being at a greater risk. These

findings support concerns of an elevated risk of overweight and obesity among Puerto Rican

youth. Similarly, the HPCHS community assessment conducted in HP determined that 50% of

the children in the community were obese compared to 14% of children in the United States

(Estarziau et al., 2006). Although community efforts to combat obesity have been matched by a

decline in child overweight and obesity rates, the obesity rates among children two to five years

of age are the highest and continue to soar well above the national averages (CLOCC, 2013).

Similarly, extant research found that the obesity risk for Latino children is increasingly prevalent

at younger ages. A study by Whitaker and Orzol (2006) determined that by the age of three

Latino children were twice as likely to be obese in comparison to White or African American

children. In addition, data revealed that Puerto Ricans mothers were at high risk of obesity based

on both BMI (71% overweight/obese) and WC values (62% at high risk). These findings were comparable to the rates reported for respondents from the HPCHS community assessment (72% overweight/obese for a sample comprising 90% women) and well above national and city rates (22% of women in the United States and 22% in Chicago) (Whitman, Williams, & Shah, 2004). Prior research including the HPCHS, Sinai Urban Health Institute, and CLOCC among others has not assessed the relationship of maternal-feeding strategies as an antecedent variable influencing child weight status. Evidently, the alarming obesity risk among Puerto Rican children and mothers suggests that the community may benefit from increased awareness and educational programming that is inclusive of child-feeding practices.

D.   **Acculturation**

Various indicators were used in this study to characterize the acculturative process among Puerto Ricans. First, the BSPR was used to assess maternal cultural preferences for either Puerto Rican or American culture (Cortes, Rogler, & Malgady, 1994). Scoring high on both cultural domains was indicative of biculturality. Conversely, individuals who were unacculturated were determined by low scores on both domains. In addition, based on the BSPR, maternal acculturation status was defined as bicultural, Puerto Rican-dominant, American-dominant, or unacculturated to either American or Puerto Rican cultures. Maternal place of birth, years of residence in the United States, and generational status were also used as measures of acculturation. Consistent with the literature, most of the Puerto Rican women (70%) in the study were bicultural (Cortes, Rogler, & Malgady, 1994; Ramos, 1998); this is attributed to the transnational status of Puerto Ricans whose American citizen status affords them access to cultural immersion on the island of Puerto Rico. In addition, the presence of the U.S. government, customs, media, and the English language on the island of Puerto Rico provide the

Puerto Rican women who lived on the island as well as those who visited it frequently exposure to American culture. Most of the women in the study were born in the United States. (83%) and many were first-generation Puerto Ricans (66%).

Regardless of the maternal place of birth or the number of years living in the United States, their exposure to Puerto Rican culture in the HP community of Chicago as well as the practice of cultural traditions at home provided them access to both cultural experiences. Thus, the majority of the participating mothers preferred English as their primary language (90%), but most reported being bilingual (89%). Although biculturalism was employed as a more accurate and inclusive measure of acculturation, bilingualism was not used for nonparametric and multivariate analyses because—due to the predominance of bilingualism and biculturalism— language has been deemed an inadequate acculturation measure for Puerto Ricans (Andersen et al., 2004). This is unique to Puerto Ricans in comparison to Latino immigrants from other Latin American countries where Spanish is the dominant language and consequently the language of preference among first-generation and second-generation immigrants. Thus, the heterogeneity of spoken language among Latinos in the United States is not reflected in linear acculturation measures. Nonetheless, this study used a biculturality scale validated with a Puerto Rican sample as well as several proxy measures to capture a greater understanding of the unique experiences of Puerto Ricans and better determine the impact of acculturation on childhood obesity.

E.   **Specific Aim 1: Child-feeding Practices**

This section discusses the associations for the child-feeding practices of Puerto Rican mothers in HP, Chicago, Illinois. The discussion in this section explores **Specific Aim 1**: to

determine the association between maternal child-feeding practices and: (a) child anthropometry, (b) child-feeding characteristics, and (c) maternal and child characteristics.

1.   **<u>Association between child-feeding practices and child anthropometry</u>**

This section will discuss the association between maternal child-feeding practices and child anthropometry. The child-feeding domains were generally poor predictors of child overweight. However, bivariate analyses established associations for both CC (protective—e.g., child control) and PC (risky—e.g., pressure to eat) dietary practices with child anthropometric indicators. For instance, Puerto Rican mothers who used pressure tactics to get their children to eat were more likely to have children with lower BMI and WC. The findings were consistent with the literature, which found that pressure to eat inversely influenced child dietary intake (Galloway et al., 2006) and either lowered BMI (Faith et al., 2004; Galloway et al., 2006) or had no bearing on weight measures (Johannsen, Johannsen, & Specker, 2006). However, these cross-cultural studies were based on small aggregate samples of Latinos (e.g., n=2), which cannot be used interpretatively to extrapolate findings to this sample of Puerto Ricans from HP. Nonetheless, research demonstrates that Latinas have a greater likelihood to employ coercive, PC feeding strategies, such as exerting high control to encourage food intake, particularly pressuring children to eat (e.g., demands, threats, and rewards) (Hughes et al., 2006). The fact that preschool children slow down eating in quantity and frequency may compound concerns among Latina mothers who consider "chubby" children (Johnson & Birch, 1994) as an indicator of good health (Diaz, Mainous, & Pope, 2007). In fact, Latinas with a clinically overweight child have expressed concern over their child not eating or not eating enough (Garcia, 2004). This may increase the propensity for some Latinas to pressure their children to consume larger quantities of food or to eat more frequently (Hughes et al., 2006) and hence contribute to child overweight

(Daniels et al., 2005). Thus, the experience of pressuring children to eat among Puerto Rican

mothers may be uniquely different and manifest in distinct patterns of child-eating and weight.

The same concern over child weight can also influence maternal likelihood to practice

other coercive PC strategies, such as restriction that may contribute to negative consequences

like overweight and obesity. Even though there was no association between child anthropometric

indicators and the child-feeding domains measuring restriction based on bivariate analyses,

regression analyses determined that restriction for weight, rather than pressure to eat, was the

strongest predictor of child overweight among HP Puerto Rican children when using BMI

percentiles. Similarly, the literature supports the relationship between the use of restriction and

the consumption of restricted foods (Faith et al., 2003; Hughes et al., 2006; Savage, Fisher, &

Birch, 2006) and weight gain (Faith et al., 2004; Faith et al., 2003; Savage, Fisher, & Birch,

2006), especially for girls (Schatch et al., 2006). In a study assessing the relationship between

child-feeding practices and weight, Faith and colleagues (2004) found that restricting food as

early as age three predicted weight gain at age five for children with obesity risk. Research also

determined that food restriction was associated with overeating, indicative of higher BMI

indices, and hence, increased the risk of obesity (Faith et al., 2003).

Evidence indicates that food restriction may be rooted in parental concern over child

overweight. Musher-Eizenman and Holub (2007) found that parents who were more concerned

about their child being overweight were more likely practice restriction for health benefits as

well as weight management. In addition, May and colleagues (2007) discovered that Latino

parents of preschoolers were more likely to be concerned over their child becoming overweight

in comparison to their White and African American counterparts. However, the concern with

overweight may not be as apparent among the Puerto Rican mothers in this study given that there

was only a small percentage of mothers with overweight children who acknowledged that their child was overweight (4%); and, only about one in ten mothers agreed with a physician's diagnosis of their child as overweight. In fact, approximately 20% of Puerto Rican mothers did not perceive their overweight child as overweight even when that child was diagnosed by a physician as being overweight. Therefore, there may be other concerns that influence Puerto Ricans to exert restriction for weight.

From a cultural perspective, Latino children may have a greater risk of obesity because their mothers have been observed as exerting more restrictive feeding strategies in comparison to their White counterparts (Faith et al., 2003). Again, a cultural preference for heavier children may predispose Puerto Rican children to coercive feeding practices (e.g., restriction) that promote overconsumption. However, a family history of overweight or obesity (e.g., the mother being overweight) was a better predictor of concern for child weight than feeding practices (Faith et al., 2004). Therefore, mothers of overweight children may be more likely to practice restriction as a means of weight management (i.e., restriction for weight). Correspondingly, the propensity of overweight and obese Puerto Rican mothers (71%) in the present study sample may parallel prior research whereby mothers may be more likely to restrict for weight concerns because of their own family obesity history. However, restriction leads to a counterproductive bi-directional cycle whereby, as the child resists food restriction by consuming more and/or gaining weight, the parent will be encouraged to continue exerting the coercive behaviors to restrict for weight.

Conversely, bivariate analyses revealed that Puerto Rican mothers who allowed their children control over dietary intake were more likely to have children who were overweight based on WC. Regression analyses confirmed that child control continued to be the strongest

predictor of child overweight using WC percentiles. This was contrary to projections that allowing of child control would be reflective of children with healthy WC values, given that child self-regulation is a health-promoting feeding practice as defined by the CFPQ. However, child control could be interpreted as negative feeding practice depending on the availability of foods in the home. For example, some of the participants noted being concerned about child self-regulation for fear their children might overconsume unhealthy foods. Namely, questions that imply that the child is allowed to eat whatever her or she wants and whenever he or she wants caused parental concern (e.g., "Do you let your child eat whatever s/he wants?"; "Do you allow this child to eat snacks whenever s/he wants?"). However, the CFPQ instrument does not distinguish between these differences. Therefore, findings that capture the health benefits of child control may be skewed towards those items that were deemed as health-compromising. In addition, extant literature observing the relationship of child-feeding practices on child adiposity has been based on BMI rather than WC. Research suggests that the support of child self-regulation of dietary consumption reduced fat intake (Bourcier et al., 2003) and lowered BMI scores (Faith et al., 2004). However, the present study did not yield a significant relationship between child control and BMI among these Puerto Rican children. In addition, the evidence has been inconclusive in determining whether parental encouragement of child self-reliance of dietary consumption is beneficial. Contradictory research indicated that mothers who did not allow self-reliance also had children with lower BMI (Faith et al., 2003). Nonetheless, the findings make an important contribution because they support the use of WC as a predictor of overweight in relation to maternal child-feeding practices. Prior research on weight measures for preschool children found WC to be a better predictor of excess adiposity and obesity-related disease risk in children than BMI (Maffeis et al., 2000; Moreno et al., 2002; Savva et al., 2000).

However, some researchers claim that BMI is the best measure of excess dietary intake for children when transformed to Z-scores (Ulijaszek, 1997) as well as a better predictor of child overweight status (Prentice & Jebb, 2001). Nevertheless, WC may be a better predictor of overweight for Puerto Rican children.

Although Puerto Rican mothers were more likely to practice coercive, PC strategies related to authoritarian parenting practices (i.e., restriction and pressure to eat), which promote unhealthy child dietary intake among children (Arredondo et al., 2006) and child overweight (Faith et al., 2004), research assessing both restriction and pressure on child weight status did not find either of the feeding strategies to be good predictors of child overweight (May et al., 2007). Regardless of whether the mothers employed pressure or restriction, these coercive strategies increase the child's external orientation to food intake. Evidently, more research may be necessary to delineate the relationship between CC strategies and their effect on reducing BMI levels and overweight risk.

2. **Association between child-feeding practices and child-feeding characteristics**

First, the relationship between maternal child-feeding strategies and child daily dietary consumption is discussed. Child dietary intake both in quantity and quality play an important role in understanding the relationship between parental feeding strategies and child weight status. Namely, what a child consumes in relation to the foods that a parent makes available or models eating can lead to lifelong dietary habits that may predispose the child to becoming overweight. Results from the present study revealed high variability of the intake for unhealthy dietary beverages and snacks across the CFPQ domains that are considered either protective or risky for child obesity. For example, lower consumption of sweetened beverages was reported by mothers who practiced health-promoting feeding practices (e.g., balance and

variety, involve, and environment), while a higher intake of these drinks was identified by mothers who employed health-compromising strategies (e.g., monitoring and emotional regulation). These results support existing research that attributed protective strategies to healthy dietary practices (Bourcier et al., 2003; Faith et al., 2004; Ramos & Stein, 2000; Reifsnider, Keller, & Gallagher, 2006; Savage, Fisher, & Birch, 2007; Sherry et al., 2004) and linked adverse child feeding to unhealthy dietary practices (Faith et al., 2003; Galloway et al., 2006; Hughes et al., 2005; Hughes et al., 2006; Johannsen, Johannsen, & Specker, 2006; Orrell-Valente et al., 2007).

In addition, mothers who practiced emotional regulation were more likely to report that their children consumed greater amounts of 100% fruit juices suggesting that Puerto Rican mothers who exercise more control over their children's dietary practices may be more inclined to use sugary drinks to soothe their children when they are upset in the absence of thirst or hunger. As previously noted, sweetened beverages contribute to 400 calories of the total daily calories consumed by children, which has been associated with an increased obesity risk (USDA & USDHHS, 2010). However, health risks may be countered due to the inverse relationship between the mothers' encouragement to provide a healthy dietary environment and involve their children in the meal planning and preparation process.

Correspondingly, maternal engagement in negative PC feeding practices like reward increased the likelihood for children to consume energy-dense and nutrient-poor sweet snacks in greater quantities, while mothers practicing CC positive strategies like balance and variety reported lower consumption of these unhealthy foods. Mothers who employed reward mechanisms to get their children to eat were more likely to have children who ate more sweets and fast foods. The use of desserts and treats to encourage the completion of activities can prove

to be a harmful practice. Snethen and colleagues (2007) found that Latino parents use sweets as rewards. The literature indicates that parents positively reinforced the consumption of sweets by using reward mechanisms (Sherry et al., 2004) and in turn manifesting the child's food intake response (Orrell-Valente et al., 2007), which may alter their internal dietary self-regulation feelings and increase the potential for weight gain (Faith et al., 2004).

Conversely, mothers who employed monitoring child dietary intake reported their children consuming fewer sweetened drinks and unhealthy sweet snacks. This contradicts research claiming that the use of parental monitoring to control or limit the amount of unhealthy foods consumed would be indicative of a counterproductive, health-compromising feeding practice similar to restriction whereby the child will desire and consume more of the foods he or she is restricted from eating (Musher-Eizenman & Holub, 2007). However, evidence is inconclusive with regard to the use of monitoring dietary intake in supporting positive or negative dietary habits. For example, Arredondo and colleagues (2006) found that monitoring for healthy eating was positively associated with children's healthy eating and negatively associated with unhealthy eating. Similarly, some of the Puerto Rican mothers in this study verbalized that monitoring that is not coercive, but supportive may be beneficial.

Consistent with the literature, Puerto Rican women who promote a healthy dietary environment at home were more likely to report that their children consumed greater quantities of fruits (Mennella et al., 2005). In particular, investigators found that Latinas are more likely to provide their children fruits as snacks (Sherry et al., 2004). Traditional Latino dietary practices promote the employment of protective behaviors that decrease obesity risk, such as a healthy food environment (Swinburn et al., 2004) and more balanced and varied diet rich in fruits and vegetables (Seth et al., 2007). Evidence demonstrated than when parents provided a healthy

environment (e.g., modeling of eating fruits and vegetables), their children were more likely to eat healthy foods (Reifsnider, Keller, & Gallagher, 2006). However, it is unclear from the findings of the present study whether the Puerto Rican children in this sample benefited from parental modeling given that there was no relationship between parental modeling and child dietary intake.

Although most of the literature centers on the negative consequences related to reward tactics, findings on the practice of food as a reward for child feeding determined that refraining from rewarding children with foods is also associated with healthy behaviors. Namely, Puerto Rican mothers who did not employ reward mechanisms were also more likely to have children who consumed greater quantities of vegetables. In addition, personal accounts by some of the respondents supported a greater use of vegetables as snack choices over nutrient-dense options like potato chips. Thus, this may be a characteristic unique to Puerto Ricans. For example, this study builds on exiting findings that Latinas use fruits as special treats (Sherry et al., 2004), and suggests that they may also choose to use vegetables as compensation or reward for good behavior. Furthermore, this may indicate that positive reinforcement of consumption of fruits and vegetables can prove to be a health-promoting practice.

Generally, Puerto Rican mothers who promoted protective practices were more likely to have children who had healthier diets. However, there were no significant associations by multivariate analyses between the CFPQ variables and child dietary intake, which may reflect poor predictability of dietary intake for the CFPQ domains. Thus, it is inconclusive whether maternal child-feeding practices are correlated with child dietary intake in this sample.

Next, the relationship between child-feeding practices and child-feeding assistance is discussed. Many of the mothers in this study reported receiving social support for child feeding from family members, primarily the child's grandparents (37%), the father (28%), or an older sibling (8%), even though they self-identified as the primary caretaker for their children. Evidence demonstrates that the support from family as a social network challenges maternal control over child feeding, especially when maternal intention to promote healthy dietary habits is countered by family members (Jain et al., 2001). In Latino culture particularly, maternal decision-making with regard to parenting and child feeding is often affected by the intergenerational influence of their elders' beliefs, traditions, and customs, which may override parental intention to practice health-promoting feeding strategies. Among Puerto Ricans, the value for *respeto* or respect towards elders and authority figures may weigh in on the adoption of these culturally rooted beliefs (Comas-Diaz & Duncan, 1985; Harwood et al., 1996), which may influence mothers as well as children to adhere to dietary customs that may contribute to overeating and overweight. Similarly, research by Reifsnider and colleagues (2006) found that low-income Latinas place a greater regard on the child feeding recommendations of family members, especially older female authority figures, than the expertise of health practitioners. Consistent with the literature by Sanjur (1995), maternal grandmothers in HP were prominently involved in providing supportive assistance with child feeding for the participating Puerto Rican children.

As noted, fathers and older siblings were also involved in providing child-feeding assistance to the children in this study. A study of immigrant Latinas found that women's health behaviors were influenced most by family, particularly their husbands and children (Bauthum & Baumann, 2007). In addition, previous research demonstrated that fathers impact their children's

dietary intake of fats, fruits, and vegetables (McCabe et al., 2007; van der Horst et al., 2006). It is also important to recognize the role of fathers in Latino families because they are generally more involved with their children than other ethnic groups (Crawford et al., 2004). In addition, Latino fathers may also have different perceptions of or may express different barriers to healthy eating. For example, despite evidence that Latinos generally consume more fruits and vegetables, a focus group of Latino fathers indicated that Latinos did not consume low-fat foods, fruits, and vegetables (Snethen et al., 2007).

Similarly, children's dietary choices are influenced by their older siblings (Sherry et al., 2004); specifically, the consumption of fatty foods has been positively associated with the dietary intake of older siblings (van der Horst et al., 2006). However, most participants reported being the head of the household and carrying the primary responsibility for child feeding at home. This may weaken the influence of other family members in their social network on parenting and child feeding. However, the lack of social support may present more challenges in maintaining health-promoting practices. According to Anderson and colleagues (2004), Puerto Rican women who are heads of the household may lack social support with child feeding and other protective health practices such as breastfeeding infants. Regardless of the lack of support, there are culturally ingrained beliefs about weight, diet, and health that can impact maternal health behavior and feeding practices.

Supportive practices assessed in this study include feeding and preparing meals for and monitoring dietary intake of the respondent child. Only assistance with child feeding was significantly associated with the observed CFPQ domains. Of the twelve child-feeding practices explored, mothers receiving assistance were also more likely to use food to regulate their children's dietary intake. The employment of food for emotional regulation is a risky feeding

behavior that may predispose children to eating or overeating in the absence of hunger and hence overweight. The prevalence of this practice among the Puerto Rican women may be due to the influence of their elders or others providing child-feeding assistance who similarly indulge children with foods to control their behavior. Alternately, mothers who want to regain control (or because of lack of control) may want to appease their children's emotional behavior as a result of an overindulgent conditioning supported by influential others who provide child-feeding assistance. However, there is little evidence to support this.

On the other hand, mothers who received assistance from a family member with child feeding were more likely to teach their children about the nutritional value of foods, which is a health-promoting practice. Thus, mothers who receive additional support with child feeding may have more time to educate their children about the benefits of healthy foods. Upstream supportive mechanisms in Latino culture may also be protective. For example, as previously noted, Latinos are more likely to use fruits as snacks and rewards (Sherry et al., 2004). Therefore, a supportive home environment can provide a protective effect against unhealthy dietary practices and overweight (Swinburn et al., 2004).

In addition, the number of family meals consumed on a daily basis has been found to promote protective health benefits (USDA & USDHHS, 2010). Given that most of the Puerto Rican mothers participating in this study reported their family eating at least one meal daily together, this would suggest that Puerto Ricans may benefit from sharing meals as a family. Having at least three meals a week together was found to reduce child obesity risk (Hammons & Fiese, 2011) and increase children's likelihood to meet the "5-A-Day" campaign recommendations (Christian et al., 2013). Similar research indicates that families that regularly shared at least an evening meal daily (i.e., more than five times a week) reduced the prevalence

of obesity for preschool-aged children, particularly when the child received adequate sleep and had limited daily television viewing time (Anderson & Whitaker, 2010).

In relation to child-feeding practices, Puerto Rican families sharing more family meals together on a daily basis engaged in health-promoting practices, such as encouragement of balance and variety of healthy dietary choices and teaching about nutrition. Aligned with the evidence-based benefits of family meals consumed regularly, it was expected that other health-promoting practices would be practiced as well. Interestingly, involvement, which particularly captures child participation in the planning and preparation of family meals, was not associated with the frequency of shared family meals. However, an overwhelming number of mothers reported sharing two or more family meals daily.

Although mothers play a leading role in a child's diet and eating behaviors, the strong presence of family members also shapes a child's frame of healthy and unhealthy foods. These influential others may at times hold greater authority or regard in the dietary choices made by mothers and their children, which may undermine nutritional self-efficacy. Due to the small sample size no comparison was possible to determine the relationships between nuclear or extended family and child obesity. In addition, given that the data on assistance with child feeding are skewed, the findings of this study were inconclusive in determining the magnitude of the protective nature in teaching about nutrition, which may be countered by a maternal preference to use food for emotional regulation. Nonetheless, family demographics can also contribute to a child's dietary access, food intake, and weight status.

3.   **Relationship between child-feeding practices and maternal and child characteristics**

This section discusses the relationship between maternal child-feeding strategies and maternal and child characteristics. First, with regard to maternal descriptors, most of the Puerto Rican women in the study were single, college-educated, and employed mothers earning about $40,000 or less. The median household size was a family of four with approximately two children. There was a fairly equal distribution of boys and girls in the study. Most of the children in the study had one or more siblings. About half of the children did not have an older sibling. Thus, the profile of Puerto Rican women in HP parallels that from findings in prior research, which indicates that more Puerto Rican women are heads of their household (Vega & Amaro, 1994) and live below the poverty level (Sanjur, 1995); however, the educational attainment of mothers did not fit this profile, given that the majority had a college education.

Maternal age was significantly correlated with both protective and risky maternal-feeding practices. Older Puerto Rican mothers were more likely to provide a healthier food environment and monitor the intake of unhealthy foods. On the other hand, using reward mechanisms and pressuring children to eat were more prevalent among younger mothers. This would indicate that Puerto Rican children of younger mothers may be at an elevated risk of becoming obese. Similar research on child-feeding strategies found that maternal age influences health practices. Namely, younger Puerto Rican mothers were more likely to model unhealthy dietary habits (i.e., consuming foods high in sodium and sugar, fatty snacks or desserts, and artificially flavored drinks) (Andersen et al., 2004). However, countering literature indicates that maternal age is not a good predictor of health behaviors (Abraido-Lanza et al., 2005) or perceptions (Hackie & Bowles, 2007) among Latinas. The contradictory findings correspond with the results of the

present study demonstrating that Puerto Rican women employ both health-promoting and health-compromising feeding practices and their likelihood to use one over another may vary by age.

In addition, a mother's child-feeding tactics may be influenced by her level of education and income, given that older mothers of younger children were more educated and had higher annual household incomes. In particular, more educated mothers were more likely to monitor their child's consumption of unhealthy foods. Thus, a higher level of education may prompt a greater concern over a child's nutritional intake and hence contribute to an increase in monitoring of junk foods. However, women earning a higher income were less likely to involve their children in meal planning and preparation. Prior research did not support the influence of education (Hackie & Bowles, 2007) or income on risky health behaviors (e.g., smoking, alcohol consumption, leisure-time, and physical activity) (Abraido-Lanza et al., 2005). Therefore, lower involvement may be due to time constraints for meal planning and/or preparation because of work commitments.

Meal preparation at home has been reported as being too time-consuming, especially among mothers with preschoolers (Jabs et al., 2007). However, maternal employment status did not influence child-feeding practices in the present study. Nonetheless, Puerto Rican mothers' child-feeding practices varied by household size whereby mothers with more children were more likely to provide a healthy food environment and less likely to use food to regulate their children's emotions. Evidence indicates that having a larger family affords mothers more social support and assistance with child feeding. Among the family dynamics, child characteristics also impact child feeding and weight status.

With regard to child descriptors, child age also had an influence on the maternal practices. This is expected as children who are between the ages of two and three and are learning to self-feed are less independent than older children, for example. Thus, mothers with older children were more likely to involve their children in meal planning and preparation. Conversely, mothers of younger children were more likely to employ emotional regulation. However, with regard to mothers' health behavior and marital status, researchers determined that the prevalence of child overweight in five- to six-year-old Latinos was comparable across marital status, education, and income (Ariza et al., 2004).

F. **Specific Aim 2: Child Anthropometry**

The discussion in this section explores **Specific Aim 2**: to determine the relationship between child anthropometric measures (age- and sex-specific BMI and WC) among Puerto Rican children in HP and: (a) child-feeding characteristics, (b) maternal anthropometric indicators, and (c) maternal and child characteristics.

1. **Relationship between child anthropometry and child-feeding characteristics**

In this section, the relationship between child anthropometry and child dietary intake is reviewed. Contrary to widely accepted literature establishing the link between nutrition and obesity, there were no relationships established between maternal report of child dietary consumption and child weight status. Findings from the HPCHS revealed alarming rates of obesity for adults and children two to twelve years of age along with limited knowledge about nutrition recommendations (Estarziau et al., 2006). Discordance between the present study and prior research may indicate issues with or differences in the data collection instrument, data collection methods, and/or variances in the interpretation of these. Namely, the parents expressed

difficulty in determining serving sizes. In addition, the CHIS instrument used was limited in capturing a complete representation of the participating children's dietary intake. For example, consumption of dairy products and water were not included in the instrument. Low-fat dairy intake has been found to be beneficial; however, excess consumption of dairy products may increase risk for overweight. Moreover, based on the BSPR, mothers reported a greater preference for consuming Puerto Rican foods (median=5 days per week) over an American diet (median=2 days per week). Researchers found that Puerto Ricans eating a traditional diet of rice and beans had an increased risk for metabolic syndrome while consuming a meat and french fries diet (i.e., American) increased the risk for high blood pressure (Noel et al., 2009). The consumption of sweets and an American diet was independently associated with higher WC, and, hence, increased obesity risk. Further research is warranted to gain greater understanding between dietary intake and child weight among Puerto Ricans; and, to uncover the extent to which interventions in HP have made a difference.

2. **Relationship between child and maternal anthropometry**

This study also aimed to predict obesity risk among Puerto Rican children in HP by determining the relationship between maternal and child weight status. Bivariate analysis supported a positive association between the WC of Puerto Rican women and the WC of their children, but maternal and child BMIs were not correlated. This corresponds with claims that WC is a better predictor of excess dietary intake than BMI for children (Maffeis et al., 2000; Moreno et al., 2002) as well as adults (Lofgren et al., 2004). Although various studies have confirmed a relationship between maternal and child obesity among Latinos (Melgar-Quiñonez & Kaiser, 2004; Reifsnider, Keller, & Gallagher, 2006; Villa-Caballero et al., 2009; Whitaker et al., 1997) including Puerto Ricans (Tanasescu et al., 2000), these have been based primarily on

BMI. The findings of this study may indicate that WC is a better indicator of overweight for Puerto Ricans. More research is needed to determine whether WC is a stronger predictor of child obesity risk than BMI among mother-child pairs for other Puerto Rican samples.

3. **Relationship between child anthropometry and maternal and child characteristics**

The present study also identified potential maternal and child characteristics that may modify the relationship between child-feeding practices and child weight status. As expected, child BMI was associated with the sex of the child. In particular, girls were more likely to be obese and to have higher obesity rates. Sex differences in weight status parallel differences in maternal child-feeding practices. For example, mothers employ more controlling tactics like restriction over girls (McCabe et al., 2007) than over boys due to social pressure for women to be thin (Johnson & Birch, 1994), which may increase the risk of obesity for girls. In communicating messages about weight, mothers are more likely to encourage boys to eat more to grow muscles and be stronger while girls are discouraged from eating to control their weight. In addition, girls who had higher identification with their mothers were more likely to have better self-images and better eating habits than their counterparts with low maternal identification (Hahn-Smith & Smith, 2001). However, this counters research indicating that Latino boys have been found to have a greater risk for obesity (Gordon-Larsen, Adair, & Popkin, 2003).

In addition, the present study also found that child WC was associated with the number of children per household as well as the presence of older siblings. Puerto Rican mothers with smaller households had children with lower risk for obesity. Similarly, some of the literature indicated that family size reduced the risk for childhood overweight (Baker et al., 2010; Garasky

et al., 2008). However, other researchers claimed that belonging to larger families was a risk factor for child obesity, particularly for Latinos and African Americans who may have larger families (Christakis & Fowler, 2007; Kaplan, Liverman, & Kraak, 2005). Conversely, other investigators claimed that the mother's childhood household size and food security history predicted child weight status instead of the child's own household size (Crawford et al., 2007).

The presence of older siblings may in particular influence child obesity because siblings serve as role models and young children desire to imitate their older siblings (Berk, 2008; Sherry et al., 2004). Children's dietary intake has been associated with their siblings' intake, which affected fat consumption (van der Horst et al., 2006), and, hence, child weight status. However, the current study found that children with older siblings had a lower risk for obesity compared to children without siblings. This could suggest that older siblings are modeling healthy dietary practices. Conversely, it may also suggest that singletons are at a greater risk for obesity due to greater overindulgence by adults or poor adult role modeling. For example, researchers have found that children's diet was shaped by their mothers' diet (Anderson et al., 2004) and role modeling (Reifsnider, Keller, & Gallagher, 2006).

G. **Specific Aim 3: Acculturation**

The discussion in this section explores **Specific Aim 3**: to determine the association between acculturation of Puerto Rican mothers and: (a) maternal child-feeding practices, (b) child-feeding characteristics, and (c) child anthropometry.

1. **Association between acculturation and child-feeding practices**

In this section, the association between acculturation indicators and maternal-feeding strategies is discussed. Based on bivariate results, the strongest predictors were

acculturation status, Puerto Rican dominance, American dominance, and the number of years of residence in the United States. Findings demonstrate that acculturation influenced Puerto Rican mothers' likelihood to employ both health-compromising and health-promoting feeding strategies. With regard to negative feeding approaches, bicultural mothers in this study practiced rewarding and pressuring tactics to encourage their children to consume more foods. Given that the majority of the mothers were bicultural (70%), there may be a unique experience among bicultural Puerto Ricans with regard to having a strong identification with both Puerto Rican and American cultural values. Such values may influence child feeding differently than those of mothers who have a cultural preference for either Puerto Rican or American values, or mothers who are not of Puerto Rican descent. Consequently, analyses also revealed that mothers who were Puerto Rican-dominant were less likely to use food as a reward mechanism, while American-dominant mothers were more likely to do so. In addition, only women expressing high Puerto Rican cultural dominance were less likely to pressure their children to eat more. Regardless of cultural influences, the use of reward and pressure tactics was still prevalent among Puerto Rican women with increasing number of years residing in the United States. Furthermore, the longer the length of U.S. residence, the greater the maternal likelihood to monitor their children's dietary intake of unhealthy foods.

According to Hughes and colleagues (2005), Latinas have been found to employ more coercive feeding strategies in comparison to African Americans and Whites to manipulate what their children eat, which may encourage overeating and overweight. In particular, a cross-cultural study by Hughes and colleagues (2005) found that Latino parents were more likely to practice PC control strategies such as rewards and pressure to eat in comparison to their African-American counterparts. Among the controlling feeding practices, Latinas are more likely to

employ authoritarian styles including restriction (Faith et al., 2003) and pressure to eat (Hughes et al., 2005), which promotes unhealthy eating habits among children (Arredondo et al., 2006). Mothers often resort to tactics, such as demands, threats, and rewards, which have been found to increase the child's external response to food intake and the propensity to overeat. In addition, monitoring, like restriction, was found to have a counterproductive response whereby the child will desire to eat the foods that are monitored or restricted. Prior research established that monitoring as a strategy to track or enforce portion control of dietary intake increased children's overeating and overweight (Sherry et al., 2004).

With regard to protective feeding practices, American cultural dominance and the number of years of U.S. residence were indicators of acculturation. In particular, American-dominant mothers were more likely to allow their children to control or self-regulate their dietary intake than their Puerto Rican-dominant or bicultural counterparts. This suggests a potential protective effect among Puerto Rican women who have acculturated to American culture. However, child control among Puerto Rican women from HP was positively correlated with child overweight measured by WC, countering the proposed protective effect of child control. Nonetheless, acculturation may explain the incongruence between the benefits and disadvantages of promoting child control in this study, given that American-dominant participants were more likely to engage in this behavior. Because the number of participants who were exclusively American-dominant (i.e., highly acculturated) was small (n=8), it is difficult to make conclusive interpretations on the effect of acculturation on child control.

Latinos, specifically Puerto Ricans, may place a different value on child self-regulation. In particular, research indicates that Latinas, in comparison to African American mothers, used CC strategies that encouraged child control of food consumption based on the child's satiety cues

(Hughes et al., 2006), which may be beneficial in supporting healthy weight status (Faith et al., 2004), but these studies did not examine the influence of acculturation on child control. In addition, there may be other factors that influence variations in the practice of child control. For example, it was previously noted that the CFPQ instrument items did not distinguish between positive and negative elements of child control, given that items for this domain were inclusive of both. Furthermore, research indicates that self-reliance may be countered by the mother's role modeling of self-regulation over "unhealthful" foods. Lack of role modeling or parental overindulgence of calorie-dense, nutrient-poor foods may have a negative impact on children's self-control for unhealthful energy intake and may increase body fat (Savage, Fisher, & Birch, 2007). Thus, the Puerto Rican children in this sample who were supported in self-regulation may be overindulging and/or snacking on more palatable, unhealthy foods if their mothers did not model healthy habits and/or make unhealthy choices unavailable, which may, in turn, promote higher WC. Research supports that lack of parental modeling among younger Puerto Rican mothers may pose particular concern, given that this group has been found to have a greater likelihood of consuming discretionary foods (Anderson et al., 2004). However, in the present study, a majority of the Puerto Ricans mothers regardless of age reported modeling healthy dietary intake. There may be a discrepancy with maternal report of modeling behavior and actual behavior, though. Targeted educational programing for younger mothers may help decrease this risk.

In addition, years of U.S. residence was a good proxy measure for positive CC practices. With increasing number of years of U.S. residence, Puerto Rican mothers were more likely to promote dietary balance and variety and a healthy food environment by providing nutritious snacks and meals. Swinburn and colleagues (2004) found that preserving Latino cultural values

and practices promotes the employment of protective behaviors that decrease obesity risk, such as a healthy food environment and a more varied and balanced diet. Children's food environment and exposure to cultural norms are influential in their dietary intake. However, acculturation may counter health benefits of a Latino diet as Latinos abandon traditional dietary customs rich in fruits, vegetables, legumes, and whole grains, and adopt an American diet characterized by larger portions of food that are particularly energy-dense, sugary, fatty, refined, and meat-based (Seth et al., 2007). According to a study by Ayala and colleagues (2005), Latinas with higher acculturation have been found to be more likely to dine out in restaurants—including fast food establishments—and to make less healthful food shopping selections, particularly because they perceived these to be healthier and more affordable options for their children.

Prior research established that Puerto Ricans acculturate to American cultural norms with increased number of years lived in the United States (Cortes, Rogler, & Malgady, 1994). The majority of the Puerto Rican participants in the present study have lived in the United States for nearly 30 years (median=27 years). Therefore, it would be expected that the participants would have an inclination to acculturate to American values, eating practices, and foods. However, there is less pressure today for Latinos to assimilate to Americanism (Winebrenner, 2005). In addition, there are also differences in the levels of acculturation across family members because immigrant children typically acculturate more quickly than their immigrant parents, which may affect parent-child dynamics, such as undermining parental authority (Portes & Rumbaut, 2001). Variances in acculturation patterns may influence child-feeding practices differently. In particular, it is important to note that most of the Puerto Ricans in this study were born in the United States (83%), which may result in distinct patterns of acculturation from other Puerto Rican migrants and/or Latino immigrant populations.

Among Puerto Ricans, a bicultural experience (i.e., simultaneous cultural immersion in American and Puerto Rican norms) regardless of residence in the United States or Puerto Rico may contribute to different feeding practices and food choices. For example, the acculturative process for island Puerto Ricans may be mitigated by their growing immersion in American culture due to the colonization on the island even before migrating to the United States. Investigators believe that the duality of American and Puerto Rican cultural engagement further enhances the degree of biculturality (Cortes, Rogler, & Malgady, 1994). In the present study, mothers who were Puerto Rican-dominant engaged in feeding practices that were health-promoting, while American-dominant mothers employed both protective and risky feeding strategies. Namely, the culturally Puerto Rican-dominant women in the study refrained from using coercive approaches like reward and pressure to encourage their children to ingest food. However, even though mothers with greater American cultural preference were more likely to allow children control over their dietary intake, they also used reward tactics. Similarly, prior research demonstrated that Latinos balance authoritarian with permissive parenting, which may be in turn protective for their children against risky behaviors (Berk, 2008). Thus, there may be a buffering effect among children with bicultural mothers of Puerto Rican descent, whereby protective and risky feeding behaviors counter each other. Moreover, research indicates that other factors besides acculturation (e.g., SES) may influence Latino dietary choices (Mazur, Marquis, & Jensen, 2003).

2. **Association between acculturation and child-feeding characteristics**

Acculturation indicators were also found to influence child dietary intake based on bivariate analyses. Puerto Rican-dominant mothers were more likely to have children who consumed greater portions of 100% juice. The literature supports that Puerto Rican women value

juice consumption (Tanasescu et al., 2000; Himmelgreen et al., 2005), preferably, orange juice (Mintel, 2010). In fact, excessive juice intake among Puerto Ricans was found to contribute to obesity among Puerto Rican children (Tanasescu et al., 2000). Similarly, the generational status of Puerto Rican mothers influenced the children's dietary intake of other sweetened beverages like sodas and fruit-flavored drinks. Specifically, children of second-generation Puerto Rican women were more likely to drink greater quantities of sweetened beverages in comparison to those from first-generation mothers. Studies demonstrate that Latinos are more likely to consume more carbonated drinks (Mintel, 2010), and provide their young children, even as early as infancy, sugary beverages in comparison to their White counterparts (Mennella et al., 2006). In particular, soda consumption among Puerto Ricans was found to be more than twice the amount consumed by Whites (Erinosho et al., 2011). Although acculturation is recognized as a factor influencing the amount of sugary drinks Puerto Ricans consume (Himmelgreen et al., 2005), generational status has not been observed as an indicator of acculturation to affect this relationship. However, Himmelgreen and colleagues (2005) found that higher acculturation, measured by length of stay in the United States and the preference of English spoken at home, predicted a greater consumption of artificially flavored drinks among Puerto Ricans in Hartford, Connecticut. The present study also revealed that Puerto Rican-dominant mothers as well as those who favor American culture reported that their children ate greater amounts of fried potatoes. Similarly, researchers found that bicultural Puerto Ricans were more likely to eat higher portions of fatty snack foods (Himmelgreen et al., 2005). Other research indicates that children have a preference for starchy vegetables like potatoes, especially when these are fried (Mennella et al., 2005). Given the popularity of fast food restaurants among Puerto Ricans in Puerto Rico as well as the mainland, fried potatoes like french fries may represent a food that

transcends acculturation (Smith, 2010). Nonetheless, it is important to note that mothers of these Puerto Rican children reported that they ate 0–1.0 serving of fried potatoes on daily basis. Therefore, although the findings were statistically significant, there is insufficient information to determine whether it is meaningful.

These findings indicate that although acculturation to American culture among Puerto Ricans influences the consumption of unhealthy dietary choices (e.g., fried potatoes and sweetened beverages like fruit punch), an inclination toward Puerto Rican culture also shapes preferences for unhealthy foods (e.g., fried potatoes and sweet beverages like fruit juice). Therefore, the consumption of fatty foods, sugary drinks, and juices may be complex to tease out as a factor of Puerto Rican acculturation. Most of the Puerto Rican participants in this study were first-generation (66%), which according to prior research would suggest a stronger identification with Puerto Rican cultural values (Cortes, Rogler, & Malgady, 1994); however, most were bicultural (70%), which is more characteristic of second-generation Puerto Ricans (Cortes, Rogler, & Malgady, 1994). As previously noted, a greater prevalence of transnationalism among Puerto Ricans contributes to a bicultural experience and may have an effect on health behaviors among Puerto Ricans (Cortes, Rogler, & Malgady, 1994). Biculturalism also may influence greater consumptions of fried potatoes, sweetened beverages, and juice among Puerto Rican children in HP.

Furthermore, there was no significant difference between acculturation and the intake of fruits and vegetables or the frequency of dining at fast food restaurants among the Puerto Rican children in the sample. Prior research indicated that Latinos with high levels of acculturation decreased their fruit and vegetable consumption (Lara et al., 2005) and increased dietary fat intake (Siatkowski, 2007), which parallels decreased Latino purchase of fruits and vegetables

(Valdez & de Posada, 2006) and eating frequently at fast food restaurants (Ayala et al., 2005; Valdez & de Posada, 2006). Similarly, studies on Puerto Ricans in New York found that first-generation youth were two or more times likely to consume fruits than their second-generation counterparts (Gordon-Larsen et al., 2003). Lower intake of dietary fiber from fruits contributed to the higher rates of overweight among second-generation Puerto Rican children (Gordon-Larsen et al., 2003). In addition, a greater frequency of consuming fast food meals among Latinos increased the risk for child overweight (Duerksen et al., 2007). Similar patterns of eating routinely at fast food restaurants have been found among Puerto Ricans (Smith, 2010). Thus, this may suggest that Puerto Ricans have acculturated to the American diet marked by reduced consumption of fruits and vegetables. Moreover, the diminishing consumption of fruits and vegetables may be a consequence of living in urban settings like HP where the availability of fruits and vegetables is less prevalent. Nonetheless, the insignificant difference between acculturation and children's dietary intake may indicate that the instruments used were poor measures of diet and/or acculturation.

3.   **<u>Association between acculturation and child anthropometry</u>**

Bivariate analyses in the present study determined that acculturation status and Puerto Rican cultural dominance influenced child weight status. No relationships were established between the acculturation indicators and maternal weight status; however, maternal acculturation as a proxy for child acculturation revealed an influence on child adiposity. First, acculturation status based on a composite score of the BSPR domains was predictive of child overweight using WC. In particular, mothers with a high value for Puerto Rican culture were more likely to have overweight or obese children at or above the 75th percentile for WC in comparison to children of American-dominant and bicultural mothers. Individual analyses of

mothers with Puerto Rican dominance confirmed that Puerto Rican children had greater WC values consistent with percentiles for overweight or obesity risk.

Some literature indicates that Latino acculturation levels may increase their risk of overweight and obesity (Fuentes-Afflick, 2006; Lara et al., 2005; Abraido-Lanza, Chao, & Florez, 2005). In particular, Fuentes-Afflick (2006) claimed that maternal acculturation status may explain higher obesity rates among Latino children in comparison to their White counterparts. Research also revealed that acculturation was attributed to higher obesity rates for children, even as early as 24 months of age (Sussner, Lindsay, & Peterson, 2009). Namely, maternal language acculturation has been identified as a predictor of childhood obesity, whereby the exclusive use of the Spanish language was associated with higher BMI rates in comparison to mothers who preferred speaking English (Sussner, Lindsay, & Peterson, 2009). In addition, researchers found that recent Latino immigrants or Latinos still residing in their native countries are less likely to become overweight or obese, unlike highly acculturated U.S-born Latinos or Latinos residing in the United States for more than 15 years (Abraido-Lanza, Chao, & Florez, 2005). This suggests that mothers who have a stronger preference for their native language or identification with indigenous customs, like the women in the present study who are culturally Puerto Rican-dominant, are more likely to predispose their children to obesity risk as reflected by more than half of the boys and girls being categorically overweight and/or obese. Studies support the influence of acculturation on the elevated obesity risk for Puerto Rican women in Massachusetts (van Rompay et al., 2012) and Connecticut (Fitzgerald et al., 2006) as well as Puerto Rican youth (Gordon-Larsen et al., 2003). However, it is important to be cautious in using language as a proxy measure of acculturation, given that the prevalence of childhood obesity persists even on the island of Puerto Rico where Spanish is spoken predominantly (Melia, 2007)

as well as in other Spanish-speaking countries like Mexico (Clark et al., 2012). Therefore, the link between language preference or language spoken and obesity may be unwarranted.

Similarly, some extant research also found no association between maternal acculturation (i.e., generational status) and preschooler obesity risk (Ariza et al., 2004; Taningco, 2007), which suggests that acculturation may not be an obesity-related risk factor among Latinos. Therefore, there are mixed results on the influence of acculturation on child obesity. However, these prior studies used language or generational status as primary measures of acculturation, while the present investigation used an acculturation scale developed with Puerto Rican samples along other proxy acculturation variables (e.g., language, generational status, and years of residence). In addition, the previous findings measured obesity based on BMI while the current study used both BMI and WC. Nonetheless, regression analyses determined that acculturation was a significant predictor of child obesity based on either BMI or WC.

H.   **Relationship of Acculturation as a Moderator**

The third aim of this study also determined whether acculturation moderated the relationship between maternal-feeding strategies and child anthropometric measures. Acculturation appears to have a greater influence on counterproductive parent feeding styles among Puerto Ricans than protective feeding practices regardless of the indicator used to measure acculturation (i.e., Puerto Rican dominance, American dominance, acculturation status, or years of U.S. residence). Given the greater correlation between the years of residence and the maternal-feeding domains, it appears that this variable may be the best predictor of acculturation among the sample of Puerto Ricans from the HP community of Chicago, Illinois. However, logistic regression analyses did not support U.S. residence as a valid measure of acculturation. In

addition, multivariate analyses determined that maternal acculturation did not modify the

relationship between child weight and the CFPQ domains. Despite being a significant predictor

for child overweight using both BMI and WC, regression analyses determined that acculturation

(i.e., biculturality, Puerto Rican cultural dominance, and American cultural dominance) did not

modify the relationship between the CFPQ domains and child overweight.

Results were inconclusive in establishing the influence of acculturation in modifying the

relationship between protective and risky child-feeding practices. Child control was the only

health-promoting predictor of child overweight using WC; and restriction for weight was the sole

health-compromising predictor of child overweight when BMI was used. Acculturation did not

modify these relationships; however, it may have an additive effect depending on the types of

metrics used. Namely, acculturation had an additive effect for WC and child control. In other

words, acculturation to American culture may magnify the risk for child obesity when child

control is encouraged. However, research indicates that allowing child control over dietary intake

promotes healthy weight status. As previously noted, this discrepancy may be attributed to

differences in interpretation of the items by the participants as well as the lack of distinction

between negative and positive elements of child control captured by the items for this domain.

Thus, the domain of child control may more closely reflect a negative PC feeding practice as

opposed to the expected positive CC approach. Given that the findings contradict the benefits of

child self-regulation in promoting healthy weight status, it may be useful to reevaluate the items

in this domain and tailor their terminology to ensure appropriateness for the community sampled.

In addition, regression analyses confirmed a significant relationship between child consumption

of sweets as a predictor of child obesity based on BMI percentiles; however, acculturation did

not moderate this relationship. Therefore, it is uncertain whether maternal acculturation status is an adequate predictor of child overweight in this sample of Puerto Rican children.

I. **Conceptual Model: Untangling the Relationship of Maternal Child-feeding Practices on Child Anthropometrics**

The following section discusses the findings in relation to the pathways that influence child obesity as outlined in the conceptual model for the relationship of maternal child-feeding practices on child anthropometrics. (See Figure 1 to reference the conceptual model).

The first pathway assessed the bidirectional relationship between maternal child-feeding strategies and child weight status. The present findings confirm that Puerto Rican mothers' feeding practices are associated with child obesity (e.g., control and restriction for weight), but the propensity for child obesity may also be prompting the tactics that mothers choose to employ. It is difficult to determine from this study whether the response is cyclical or favors one direction over another. Future studies employing qualitative research methodologies may be useful in uncovering the direction of this relationship. For example, semi-structured open-ended interviews can be conducted to learn about the mothers' behaviors with regard to child feeding and what motivates the practices they employ and when they engage in these.

The second pathway in the model evaluated sociocultural factors that serve as antecedents to child-feeding practices or moderate the relationship between child feeding and child weight status. First, the direct relationship between maternal child-feeding practices and maternal acculturation was assessed. Cultural values have been found to influence maternal perceptions about child feeding and child weight status. Culture is a historically derived, socially transmitted, fluid, and negotiated process by which individuals acquire learned behavior patterns

and beliefs (Darder & Torres, 2000; Cross et al., 1994; Gomez-Quiñonez, 1977). Cultural

identity is shaped by lived experiences and interactions in the context of their position in social

class and SES (Darder & Torres, 2000). Similarly, acculturation is a multidimensional, dynamic,

and iterative process; however, what distinguishes acculturation from culture is that members of

one cultural group adopt the beliefs and behaviors of another group (Korzenny & Korzenny,

2005; Lara et al., 2005). This study specifically identified three categories of the acculturation

paradigm among Puerto Ricans residing in HP: biculturality, Puerto Rican cultural dominance,

and acculturation to American cultural norms.

The findings from this study support prior research indicating that culturally Puerto Rican

women are more likely to balance coercive feeding practices as well as protective ones. In

particular, Puerto Rican mothers from HP were more likely to promote balance, involvement,

modeling, healthy environment, and teaching, as well as monitoring and restriction for health.

Culturally rooted beliefs and customs may influence these behaviors. In this study, acculturation

indicators (Puerto Rican dominance, American dominance, and years of residence) were found to

be associated with maternal practice of child control over dietary intake, balance, healthy

environment, monitoring, food as reward, and pressure to eat.

Next, the direct relationship between maternal acculturation and child overweight was

tested because culture also affects beliefs about child weight status. For example, Latinos are

known for valuing chubby children as a marker for health, which may increase child obesity risk.

In this study, more than half of Puerto Rican children from HP were found to be at high risk for

overweight and obesity based on WC (57% boys and girls combined); however, there was

incongruence with the mothers' ability to identify their overweight children as overweight.

Puerto Rican cultural dominance was particularly associated with greater WC.

In addition, acculturation may moderate the relationship between maternal child-feeding practices and child weight status. Prior research found that acculturation was a moderator of the relationship between diet and child obesity among Latino children two to seventeen years of age (Buscemi, Beech, & Relyea, 2011). Therefore, it was projected that maternal acculturation status would modify the relationship between child-feeding strategies and child obesity. However, in this study, acculturation did not modify that relationship, although it did have an additive effect on child overweight based on BMI as a function of the maternal child-feeding domain restriction for weight.

Moreover, acculturation may also mediate the relationship between child dietary intake and child weight status. Given that Puerto Ricans are highly bicultural, cultural norms from the traditional Puerto Rican diet along with assimilation to American dietary practices also shape the food culture of Puerto Ricans. Puerto Rican children in HP were found to consume excessive amounts of juice, sweetened beverages, sweets, and fried potatoes. In addition, their intake of fruits and vegetables was below the daily recommended five servings. These dietary behaviors may increase their risk of becoming overweight and obese. Acculturation indicators were found to contribute to the consumption of juice, sweetened beverages, and fried potatoes. However, acculturation did not mediate the relationship between child dietary intake and child overweight.

The second pathway also analyzed other factors that may directly influence child-feeding practices and child overweight including maternal social support networks and socioeconomic factors. This study confirms that Puerto Rican women in HP receive routine assistance with child care and feeding from the children's grandparents, fathers, older siblings, and other adults; however, maternal social support was not independently associated with child-feeding practices or child weight status. Although prior research demonstrates that social networks have a

protective or buffering effect on the health of Latinos (Bauthum & Baumann, 2007; Swinburn et al., 2004; Lawndale et al., 1999), social support may not extend the projected health benefits for Puerto Ricans. A study on Puerto Ricans in Boston indicated that social support networks contributed to life stressors for Puerto Rican women and did not provide the traditional protective effect found among Latinas in general (Falcon, Todovora, & Tucker, 2009). More research is necessary to uncover how social networks affect the relationship between child feeding and child weight status, particularly among Puerto Ricans.

In addition, socioeconomic factors (i.e., education, employment, and income) may be independently associated with child-feeding strategies and child overweight. This study confirms that Puerto Rican mothers have low SES based on high unemployment or underemployment (71%) and poverty levels (71%) that persist despite most of the women having at least some college education or college degree/s (67%). Although maternal socioeconomic factors (i.e., maternal education and income) were associated with some of the child-feeding domains (i.e., monitoring and involvement, respectively), these socioeconomic indicators were not related to child overweight among Puerto Ricans. According to Shi and Singh (2001), higher education levels afford better income, access to health care, and greater engagement in preventive health behaviors, and, hence, better health outcomes. However, Puerto Rican mothers and children residing in HP do not appear to have a greater health benefit from acquiring higher education. In fact, Puerto Rican women have been historically classified as being underclassed and poor regardless of shifts in higher educational attainment since the 1980s (Ramon-Zayas, 2003; Ortiz, 1998). There is a social gradient in health whereby the lower the SES, the poorer the health status (Wilkinson & Marmot, 2003). For Puerto Rican women, having poorer SES has been attributed to poorer health behaviors, particularly among those who were single, headed their

household, and had children at younger ages (Ortiz, 1995), which further compound prenatal, infant, and child health access and outcomes (Fitzgerald et al., 2006; Zambrana & Logie, 2000). For example, parental factors, such as low SES, have been found to increase the likelihood for Puerto Rican mothers to be obese (Fitzgerald et al., 2006), and may also predispose Puerto Rican children to being overweight (Fuentes-Afflick, 2006). Nonetheless, given the discordance between maternal education, as well as other socioeconomic indicators, and anthropometric measures, other factors may be confounding this association. Although this study did not aim to evaluate the moderating effects of either social support or SES between child-feeding practices and child overweight status, these should be considered as salient pathways in untangling the complexities of child obesity. Future research is necessary to understand the relationships between SES, child feeding, and child obesity status among Puerto Ricans in HP.

The third pathway explored the child's dietary intake as a mediator between child-feeding practices and child weight status. Results from this study support the association between dietary intake and child feeding with regard to the quantity of the specified foods consumed. Specifically, health-promoting practices decreased the likelihood that Puerto Rican children would have sweetened beverages or sweet snacks. Conversely, employing health-compromising strategies decreased the likelihood of eating vegetables, while increasing the likelihood of eating unhealthy foods (e.g., juice, sweetened beverages, sweet snacks, and fast food). In addition, child dietary intake may have a direct relationship with child weight status, whereby the type and quantity of foods consumed influence overweight and obesity. Although there were no relationships established at the bivariate level, regression analyses determined that child consumption of sweets was associated with child obesity. However, the dietary intake of Puerto

Rican children in HP did not medicate the association between maternal-feeding tactics and child overweight.

Therefore, it is inconclusive from this study if the consumption of certain unhealthy foods prompted Puerto Rican mothers to engage in particular feeding practices more commonly or if the particular feeding practices mothers utilized had a greater influence on child dietary intake and/or child weight status. Nonetheless, the relationship could be cyclical, but more research is warranted to establish this. Moreover, there may be other confounders affecting the relationship between foods consumed, child-feeding strategies, and child overweight among Puerto Rican children.

New pathways need to be explored in the relationship of obesity among Puerto Ricans, including how social class affects the relationship between child-feeding practices and child obesity within the context of Puerto Rican cultural identity. Social class is typically measured by educational status, race, and family income (Turnock, 2004), and has been posited as a better indicator of cultural values than acculturation (Arcia, Reyes-Blanes, & Montilla, 2000; Arrom, 2010). Social class is also a good predictor of both good and poor health as it impacts health behavior, physical and social environments, and access and utilization of health care services (Turnock, 2004). In the United States where social class is racialized and ethnicized, Puerto Rican cultural identity in HP continues to be viewed through a deficit-centered lens as poor, underclassed, and uneducated, which adds to the complexities of Puerto Ricans' bicultural identity regardless of increased access to educational attainment (Ramon-Zayas, 2003). Nonetheless, lower class Puerto Ricans have been found to be more likely to maintain traditional cultural values (Hardwood et al., 1996), but these practices do not afford them better health access or outcomes. According to Wilkinson and Marmot (2003), what distinguishes dietary

differences between social classes are the sources of nutrients, whereby the poor substitute cheaper processed foods for fresh foods like fruits and vegetables, which are recommended to stave off chronic diseases. Therefore, the prevalence of childhood obesity among Puerto Ricans in HP may be associated with a cultural identity that is conflated by an ingrained urban poor identity (Ramon-Zayas, 2003) that further compromises their health because it intersects with racial discrimination within a resource-poor environment (Franchesci, 2012). Moreover, it is important not to blame culture and to assess the impact of how social class contributes to other factors like living in toxic environments that in turn may promote obesity.

Another important pathway to explore in future research is social environmental factors, such as food access and neighborhood walkability among others. For example, other factors may confound the relationship of social support as a modifier, including the foods consumed by children that may directly contribute to child weight status. In addition, SES also influences neighborhood factors, such as access to affordable fresh produce and safe spaces for children to stay active and play. In particular, Puerto Rican mothers from HP continue to live in poverty despite their level of education, which may further limit their access to healthy food options in a community designated as a food desert (i.e., challenged by the prevalence of fast food establishments and lacking in affordable quality produce) (Gallagher, 2006). A study of Latinos in Chicago revealed that Puerto Rican families are more food insecure than other Latino subgroups (Chavez, Telleen, & Kim, 2007). Thus, children from resource-poor communities are subjected to food-insecure environments that some suggest increases the risk for obesity (Rose & Bodor, 2006). Conversely, more recently, a systematic review on the impact of food insecurity on child obesity did not support this relationship (Larson & Story, 2011). However, it is unclear the extent to which this review assessed potential differences across racial and ethnic groups.

More research is needed to uncover the implications of food adequacy among Puerto Rican children.

In addition, technological advances promote sedentary behavior and contribute to the decrease in physical activity among children. Namely, the amount of time spent viewing television and playing video games contribute to more sedentary leisure activities and increased snacking and unhealthy dietary choices (Caprio, 2006). In addition, the capacity for physical activity diminishes with increasing obesity (Caprio, 2006). Among Puerto Ricans in HP, neighborhood factors, including safety and walkability, may affect the amount of physical activity children engage in. In fact, the HPCHS found that although most HP residents lived near a park, approximately 66% did not feel safe walking in their neighborhood and about 33% felt unsafe going to the park after dark (Estarziau et al., 2006). Conversely, efforts by community organizers to counter these barriers have had a positive impact on decreasing child overweight rates, but obesity rates continue to soar above state and national averages for all children (Whitman, Williams, & Shah, 2004). However, these factors were not explored in this study.

J.   **Summary of Findings**

This pilot study was conducted to assess the relationship between the CFPQ domains, anthropometric variables, child-feeding characteristics, demographic characteristics, and acculturation. Analyses determined that Puerto Rican women who practiced child control (WC ≥75th percentile), pressure to eat (WC ≥75th percentile and BMI ≥ 85th percentile), and restriction for weight (BMI ≥ 85th percentile) had overweight children. It is important to acknowledge that child control is a CC practice that should yield healthy child weight status;

however, there may have been differences in the interpretation of this domain due to items that more closely reflect it as a negative practice.

Puerto Rican children from families who frequently ate meals together were more likely to have a balanced diet and learn about nutrition at home. Mothers who received support with child feeding from family members were more likely to teach about nutrition and to practice emotional regulation. Children who consumed sweetened beverages had mothers who practiced both health-promoting and health-compromising feeding strategies. With regard to dietary intake, Puerto Rican mothers who practiced health-promoting strategies by providing dietary balance, involvement, and healthy food environments had children who consumed less sweetened beverages; however, mothers who monitored dietary intake also had children who consumed less of these drinks. On the other hand, women who prevalently used emotional regulation had children who consumed more sweetened drinks and juices. Providing children with dietary balance and variety as well as monitoring the consumption of unhealthy foods decreased the intake of sweets. When reward mechanisms were used, children were more likely to eat sweets and fast foods, but when it was discouraged children ate more vegetables. Offering children a healthy food environment supported greater consumption of fruits.

In addition, analyses indicated that household characteristics had an effect on child-feeding practices. Child involvement in meal planning and preparation was influenced by maternal income and the child's age. Maternal age also affected feeding strategies employed by the participants. Namely, older mothers were more likely to provide a healthy environment and monitor dietary intake of energy-dense foods, while younger mothers were more likely to engage in rewarding and pressuring tactics. Maternal education also influenced mothers' likelihood to monitor child dietary intake of unhealthy foods. Most of the women (67%) had at least some

college education or a college degree and were employed (70%). Mothers who provided healthy foods at home were more likely to have more children. Maternal practice of emotional regulation increased with the number of household children and by age of the participating children.

This study revealed that child anthropometry for Puerto Rican preschool children in HP was also influenced by child dietary intake, maternal anthropometry, and demographic characteristics. Multivariate analyses determined that overweight children (BMI ≥ 85th percentile) consumed more sweet snacks. Child BMI was also associated with the sex of the child, where girls were more likely than boys to have higher BMI and more likely to be overweight or obese. However, maternal WC may be a better predictor of child overweight risk given that child WC was correlated with maternal WC. It is also important to note that being from a larger household and having older siblings also influenced child overweight (WC ≥75th percentile) for Puerto Rican preschoolers.

Next, this study sought to establish whether the level of acculturation among Puerto Rican mothers affected maternal child-feeding strategies, child dietary intake, and child overweight. Among the acculturation indicators, length of stay was associated with maternal encouragement of a balanced diet, provision of a healthy dietary environment, monitoring the consumption of unhealthy foods, using food to reward children for good behavior, and pressuring children to eat more food. However, it is important to note that most of the women in the study were U.S.-born (83%) and have lived in the United States more than 20 years (median=27 years). Puerto Rican cultural dominance was associated with rewarding and pressuring. There was also an association between American cultural dominance and child control of dietary intake, and rewarding children with food. Interestingly, these findings suggest that Puerto Rican women who have a longer exposure to American culture (i.e., longer length of

stay in the United States) or identify more with American culture (i.e., American-dominant) practiced both PC and CC child-feeding practices, while Puerto Rican-dominant women practiced only PC strategies. With regard to child dietary intake, mothers with Puerto Rican cultural dominance had children who consumed more juice. Mothers who identified independently with Puerto Rican and American cultures had children who consumed higher amounts of fried potatoes.

Maternal generational status was associated with intake of sweetened beverages. It is important to note that most of the women were first-generation Puerto Ricans (66%) indicating that they had cultural exposure to Puerto Rican values at home. Child WC was significantly related to Puerto Rican cultural dominance, while acculturation status predicted child overweight for both BMI and WC. Acculturation strengthened the relationship between maternal child-feeding practices and child overweight when WC was used as a measure; however, it did not moderate the relationship between child dietary intake and child overweight.

This study confirms that child-feeding practices influence child overweight in this community. Future educational interventions should emphasize the risks associated with pressuring children to eat, given that this domain predicted lower child overweight for both of the anthropometric indicators used. Social support may also have a positive influence on Puerto Rican children, whereby they are more likely to receive a balanced diet and be taught about nutrition. Relationships were also established between child dietary intake and several CFPQ domains. Parent-centered practices generally predicted greater dietary intake of unhealthy foods and beverages, including sweets, fast foods, and sweetened beverages. The practice of CC strategies decreased the consumption of sweetened beverages and sweets; it also increased fruit intake, and hence confirmed the protective effect of these practices. It is important to note that

Puerto Rican women may be more likely to reward their children with healthy snacks like vegetables as well as with unhealthy meals from fast food restaurants. In addition, maternal monitoring of energy-dense foods had a favorable effect in decreasing the consumption of these foods. Household characteristics also predicted child-feeding strategies. Namely, women who were older and more educated, and had higher incomes practiced more protective CC strategies than coercive PC methods. Maternal engagement in PC or CC approaches also varied by the number of children per household and the age of the participant child. Child overweight status was predicted by both BMI and WC. Overweight children were more likely to consume sweet snacks, to be females, to have overweight mothers, to come from larger households, and to have older siblings.

Of the several indicators measuring acculturation, years of residence in the United States appeared to be the best measure in predicting maternal child-feeding practices. Nonetheless, the BSPR may be a useful instrument for measuring independent levels of immersion in both Puerto Rican and American cultures and determining levels of biculturality. In this study, the BSPR contributed to the understanding of the effect of acculturation on child-feeding behavior, dietary intake, and child overweight. It is important to consider these cultural differences when targeting future research and educational interventions in this community.

K.   **Study Limitations**

There are several limitations in this study that are worth noting. The following discussion presents limitation issues with the study design and sampling technique, population and setting, data collection and analysis, and sample size, which may threaten the validity of this study.

1. **<u>Study design and sampling technique</u>**

This study was a non-experimental, descriptive cross-sectional survey design. The exploratory nature of this pilot research for a selected period of eight months from May to December of 2011 makes it subject to bias, given that the findings are limited to Puerto Rican women and children residing in HP, Chicago, Illinois at one point in time. Thus, the study may not be generalizable to women and children in other Puerto Rican communities in Illinois or across the United States or longitudinally across time. Findings may also not be extrapolated to other Latino subgroups. For example, based on the results from this study, it cannot be conclusively inferred that each of the parenting style subscales cause the mothers or their children to eat healthy or unhealthy foods. Similarly, a direct causal relationship between maternal child-feeding practices and child overweight cannot be established. In addition, results on child obesity rates may not be representative of long-term obesity and obesity-related risk in adolescence or adulthood.

The scales used for measuring child-feeding practices—acculturation and dietary intake—may have presented additional instrument biases. First, the CFPQ scale is a fairly new comprehensive measure of child-feeding practices and has been used less frequently than other more widely published and accepted scales like the CFQ (Birch et al., 2002) and the PFQ (Baughcum et al., 2000). In addition, other instruments like the Parenting Strategies for Eating and Activity Scale (Chaidez, Townsend, & Kaiser, 2011), which have been tailored to the Mexican American Latino subgroup, have emerged more recently and may be more appropriate to capture child-feeding experiences of Puerto Ricans. Moreover, the CFPQ instrument was first validated with a sample of White middle-class women and is still being validated with Latino samples; therefore, results from this study may not be comparable to extant research.

In addition, the participants identified concerns with some of the interpretation and language used in the instrument. For example, reward was construed as beneficial by mothers who provided and encouraged a healthy food environment for their children. Thus, these mothers questioned the use of the terminology of favorite foods, sweet snacks, and/or snack primarily because the definition of a favorite food or snack is subjective and could represent healthy foods like fruits, which may also be considered sweet. Similarly, the subscales of child control and monitoring may be viewed as positive or negative depending on the context of the home dietary environment and the child's health status. For instance, mothers who have unhealthy snacks (i.e., potato chips, soda, and cookies) available at home as opposed to healthy snacks (i.e., fruits and vegetables) may be more likely to exert control over their child's dietary intake and monitor quantity, frequency, and the types of snacks consumed. Correspondingly, mothers who have children that are considered overweight may also be less inclined to allow child self-regulation. The high participant scrutiny of terminology in the survey instrument may be partially due to the fact that the mothers were highly educated (67% having at least some college education) and thus were more critical of questionnaire items. Nonetheless, the differences in the interpretation of these domains may have impacted the findings differently. Further studies should distinguish between beneficial and disadvantageous elements of the CFPQ domains (e.g., child control) by measuring these separately.

However, some of the issues with the terms may have stemmed from culturally rooted beliefs or the sensitive nature of the terms. For example, most of the mothers expressed discomfort and disagreement with the use of fat and its derivatives in several of the questions. Some of the mothers who were offended by the term fat may have responded to the insensitivity of labeling someone fat, particularly their own child. Other mothers may have been reacting to

cultural preferences for children who are physically *gorditos* (chubby or plump), which they perceive as a sign of health. Thus, mothers who completed the survey in Spanish may have had a different response to these questions, given that having a child that is gordito is seen as a positive attribute. Consequently, participant variability in decoding terminology of the questions referring to child fatness may not reflect parent feeding practices around child restriction for weight. Nonetheless, the Spanish version of the CFPQ was validated with a sample of Mexican immigrants in Ohio and yielded low reliability coefficients for the emotion regulation subscale and child control (D. Musher-Eizenman, personal communication, October 20, 2011). Therefore, the instrument may not be appropriate for predominantly bicultural Puerto Ricans in Chicago.

Like the CFPQ scale, the BSPR scale used to measure acculturation has not been used widely in research on Puerto Ricans particularly to comparatively assess health and behavioral factors. This acculturation scale was also developed with recent Puerto Rican migrants from New York and New Jersey and may not be applicable to Puerto Ricans in Chicago. The BSPR also presented issues similar to the CFPQ regarding appropriateness of terminology. Namely, parents struggled with the question about the importance for their children to have friends who either were all-Puerto Rican or all-American. Given that most of the mothers were bicultural and highly value both Puerto Rican and American cultures, and, that some of the children were of mixed cultural, racial, and ethnic backgrounds, this question may not be appropriate because the parents and the children interact in social circles that are racially and ethnically diverse. Therefore, it is important to interpret these findings with caution and to explore more appropriate measures to assess acculturation. For example, research suggested that social class may be a stronger indicator of acculturation for Puerto Ricans (Arcia, Reyes-Blanes, & Montilla, 2000).

Furthermore, the use of a structured survey using a compilation of Likert scales may have compromised the responses given that Latinos have been found to have a tendency to extreme responding on instruments measuring behavioral factors in comparison to their non-Latino counterparts, particularly when 5-point scales were used as opposed to 10-point scales (Hui & Triandis, 1989).

Vagueness in the instrumentation of the CHIS to capture dietary intake may also bias the interpretation of findings. For example, given that the CHIS questions were open-ended, the mothers often questioned the amount of serving sizes. Some parents considered one serving to be 8.0 ounces of a beverage while others may have considered it to be 12.0 ounces or more, which may have resulted in over reporting or underreporting of portions consumed. Thus, the comparability between the responses given may be inaccurate and invalid. Although the instrument was open-ended, because the CHIS is structured and limited by having only seven dietary items, it may be void of capturing a complete account of the diet consumed by the participating Puerto Rican children. Moreover, this study may be limited by the omission of confounding variables, such as child physical activity and sedentary behavior.

The sampling technique for this study was a purposive, convenience sample of Puerto Rican mothers with children attending one of the six participating early childhood centers located in HP. Because the sample was not randomly selected, the findings may not be generalizable. In addition, the sample may be subject to selection bias, which can skew the findings. For instance, some of the mothers who were uncomfortable with having their measurements taken (e.g., due to being overweight) may have self-selected out of the study. Other mothers who were more health conscious may have been more prone to volunteer. In addition, mothers may have also self-selected to participate because of concern over their child's

overweight and/or health status. For example, one parent of an obese child felt compelled to contribute in order to gain further knowledge to help her son. Thus, there may be unique characteristics of mothers who volunteered in comparison to those who chose not to participate that biased the findings. The presence of selection bias may impact external validity and hence generalizability of the findings.

2. **Population and setting**

The target population consisted of Puerto Ricans residing in HP, Chicago, Illinois. The community is a designated food desert, which may limit the availability of fruits, vegetables, and other healthy foods (Gallagher, 2006). Findings on dietary intake may be biased due to poor access to healthy foods. However, the Puerto Rican community is very active in countering the limitations of fresh-produce availability as well as physical activity and educational programming to improve the health of Puerto Ricans. Vigilant efforts targeting the Puerto Rican community, such as the DEC, the PRCC, and CLOCC, working in concert with early child care programs to promote healthy feeding practices and dietary intake may have increased the parents' knowledge. Thus, the participants' responses may have been biased to favor appropriate feeding practices rather than a true reflection of the mothers' beliefs, perceptions, and practices. For example, some mothers may have underreported employing pressure to eat or healthy dietary intake because they felt that the alternate responses would not be viewed as being favorable. This may be particularly true among Latinos. Research indicates that Latinos when compared to Euro-Americans are more likely to score higher on behavioral measures due to giving socially desirable responses (Hopwood et al., 2009). In particular, Puerto Ricans have been found to be among the cultural groups to be influenced by perceived social desirability in responding to survey questions (Johnson et al., 1997).

3.   **<u>Data collection and analysis</u>**

Data were collected by maternal self-report as proxies to obtain information on child subjects; therefore, responses may be subject to recall bias of information around the child's dietary intake, for example. The findings might also be altered by differences in maternal recall. For example, mothers with greater concerns about their child's health may have had higher rates of recalling different information around their child's food experiences from child feeding to dietary intake. Other participants may have been more likely to remember positive rather than negative experiences with child feeding, which may have introduced reporting bias to the study (Gordis, 2004).

In addition, because data were gathered from mothers of Puerto Rican origin or descent, this excluded non-Puerto Rican mothers with children whose fathers were of Puerto Rican descent or origin. Recruitment efforts revealed that fathers were interested in completing the survey interviews; and grandparents, older adult siblings, and other relatives also expressed willingness to participate. Thus, children had other caregivers involved in their care, but these individuals were excluded from participation. These family members may have a greater influence on the children's dietary behaviors than their mothers. For instance, research has found that fathers' intake of fat as well as fruit and vegetable intake predicted child dietary patterns (McCabe et al., 2007; van der Horst et al., 2006). However, the present study did not observe the impact of fathers and other family members as role models for young children even though results confirmed the presence of other child caregivers at home. Thus, it was not possible to determine the effects these influential individuals had on child feeding and child obesity. Additionally, the support with child feeding received by parents from child care centers and other providers may have posed challenges in their child feeding interactions or influenced their

responses (McGarvey et al., 2006). However, the impact of the early childhood centers' food programs was also not observed in this study. Nonetheless, research indicates that using parents as a single-source method of child data collection may maximize the power of a study to detect a significant difference of the effects (Holmbeck et al., 2002).

The interviewee-researcher interaction may also confound the participant responses and hence bias the interpretation of the results. Namely, this study was conducted using face-to-face interviews, which may result in attention bias. This type of bias may have occurred if some of the Puerto Rican mothers receiving attention through their involvement in the study had a greater tendency to give more favorable responses. Furthermore, the interviewer's expectation may also bias the study. Given that the principal investigator conducted all of the participant recruitment and interviews, there may have been unintended inclinations to encourage particular subjects to participate or to lead participants into responding to questions in a particular manner. In addition, because the primary researcher also collected all anthropometric measurements and calculations, the results are limited to interpretation. Findings may also be subjected to investigator measurement error of height and WC measures. Similarly, this study may have also been exposed to analytic bias whereby the principal investigator and the statistician may have unintentionally introduced biases into the analyses and interpretation based on their expectations.

4. **Sample size**

The sample size of 100 mother-child pairs for this pilot study was small, limiting the interpretation of findings. For example, based on BMI rates, there was a narrower range of children who were overweight, because these standards categorized the majority of boys and girls as being of normal healthy weight status, which may have not allowed for detection of

relationships between the child-feeding domains, anthropometry, and acculturation. This may incorrectly suggest that Puerto Rican children are not at risk of obesity. However, research demonstrates that members of this Chicago Puerto Rican community have high obesity rates. In addition, WC values imply that Puerto Rican preschoolers have a high risk of overweight and obesity, with girls having 10% greater risk than boys. Thus, the findings could indicate that BMI is not a good measure of adiposity for Puerto Rican children. More research is needed with larger samples to determine the validity of these findings and the appropriateness of adiposity instruments for Puerto Rican samples.

L. **Study Strengths and Research Implications**

The limitations of this study are countered by several strengths and contributions. This section will discuss lessons learned from the study design and data collection and analysis. In addition, the research implications for implementation in future studies are also discussed.

1. **Study design**

The explanatory nature of this investigation provides additional information on and greater understanding of obesity and obesity-related behaviors (e.g., child feeding and dietary intake) in relation to the acculturative process among Puerto Ricans in an urban-setting, which contributes evidence for the importance of parent child-feeding practices on early childhood obesity risk. Because this is a pilot study, it will help in the development of better instruments and gauging the types of services that parents need.

The instruments used in this study contributed to new knowledge and the understanding of child-feeding practices among Puerto Ricans in Chicago. The CFPQ measure captured both health-promoting and risky behaviors and thus presents a comprehensive outlook on perceptions

and practices among Puerto Rican mothers that can be employed toward efforts to promote obesity prevention. Prior studies on child feeding focused on deficit-based health-compromising practices that were known or thought to contribute to overeating and overweight in children. In addition, the majority of studies drawing from cross-cultural participants only included small samples of Latinos, which made it difficult to draw definitive conclusions. Other studies on Latinos and child feeding were exclusively conducted on Mexican Americans or limited to aggregate samples across Latino subgroups. Therefore, this study expands the knowledge of experiences around maternal child-feeding practices and child overweight among Puerto Ricans. Conducting a full-scale study with a larger sample size across a broader span of Puerto Ricans residing in the Chicagoland area will further strengthen this study and confirm and clarify the validity of some of the preliminary findings from this study.

The issues uncovered regarding instrumentation will be useful in the development of a larger scale study. First, refinement of the CFPQ would be beneficial by tailoring terminology that was deemed ambiguous, culturally inappropriate, or insensitive. In addition, future studies may benefit from conducting open-ended qualitative interviews to understand the types of snacks that mothers provide their children and how they distinguish them from sweet, healthy, and unhealthy snacks, as well as more culturally acceptable and sensitive terminology to describe overweight and obese children. Similarly, questions could enhance knowledge regarding the types of reward mechanisms employed by Puerto Rican mothers. These findings could be used to modify the CFPQ domains and validate the CFPQ questionnaire for future use with Puerto Rican samples. In addition, given the low reliability coefficients for child control over dietary intake, providing a healthy environment, and teaching about nutrition, it may also be beneficial to probe participants to gain a greater understanding of their perception of these feeding practices and

further tailor the CFPQ instrument by adding questions that may enhance the reliability of these subscales. Furthermore, some of the parents also indicated concern over age appropriateness for teaching children about nutrition as well as involving them in meal planning and preparation because they believed their children to be too young to comprehend these concepts or participate in these activities. The mothers felt their children were too young to learn about nutrition or to understand the difference between healthy and unhealthy snacks. This may inform future interventions to educate mothers on the benefits of teaching their children about nutrition, as well as providing them with tools to do so. Some of the parents suggested strategies for engaging children in the education, meal planning, and meal preparation process, including allowing the child to make food selections in the produce area and creative ways to make meal preparation fun and kid-friendly. Consequently, future research could incorporate an educational component to increase awareness, knowledge, and behavior change by comparing maternal perceptions on these constructs from baseline. The fact that 62% of the mothers expressed interest in participating in educational workshops on nutrition supports this need.

In addition, the use of the BSPR, a biculturality scale developed with Puerto Ricans, was beneficial to the understanding of the level of cultural immersion in Puerto Rican and American cultures among Puerto Ricans in Chicago. In fact, this confirmed prior reports that most Puerto Ricans have a bicultural experience. Nonetheless, future research may benefit from employing more comprehensive measures (e.g., inclusive of social environmental, socioeconomic, social capital, social class, and sociopolitical differences) to better understand biculturality among Puerto Ricans and how it affects health and behavior. However, the BSPR used in this study is the only biculturality scale developed with and for Puerto Rican samples to date. The high reliability of the BSPR for both Puerto Rican- and American-dominance domains also indicates

that this scale is a good measure of biculturality for Puerto Ricans in HP. The Psychological Acculturation Scale (Tropp et al., 1999) has been validated for use with Puerto Rican samples; however, this scale is unidimensional and does not capture biculturality. The Abbreviated Multicultural Acculturation Scale (Zea et al., 2003), a bidimensional measure of acculturation, may be more appropriately suited for future testing of the acculturative process among Puerto Ricans, but it has yet to be tested in this community. Nonetheless, the Abbreviated Multicultural Acculturation Scale moves beyond capturing traditional cultural preferences, such as language preference, to include cultural awareness and social identity (Zea et al., 2003). Moreover, it is important to recognize that other factors have been found to be better health predictors than acculturation for Puerto Ricans, such as socioeconomic disadvantages (Andersen et al., 2004; Larsen et al., 2004), geographic and environmental factors (Perez-Escamilla & Putnik, 2006), sociopolitical factors (Andersen et al., 2004), and cultural identity and social acceptance (Padilla & Perez, 2003) among others.

Using the CHIS to capture child dietary intake provided insight into the consumption patterns of Puerto Rican children in HP that may be beneficial in future research and interventions. For example, this study confirmed findings from prior research on the overconsumption of fruit juice among Puerto Ricans, which has been found to increase obesity risk (Tanasescu et al., 2000). However, considering there may have been differences with interpreting portion sizes, future studies should include visual aids to assist parents in more accurately reporting these. In addition, future studies should utilize a more comprehensive tool to measure child dietary intake in order to gain additional information of other foods that may be contributing to greater child overweight and obesity rates.

Upcoming studies may also benefit from collecting data on patterns of physical activity and sedentary behaviors given that these factors may confound the relationships between child-feeding practices, child dietary intake, and child weight status. Tailoring or extracting items from instruments like the Parenting Strategies for Eating and Activity Scale (Chaidez, Townsend, & Kaiser, 2011; Larios et al., 2009) to Puerto Rican samples may be useful because it not only includes items on child feeding, but it also encompasses physical activity and diet.

2.   **<u>Data collection and analysis</u>**

Among the next steps may also be the inclusion of other influential child caregivers as participants, such as grandparents and fathers. Capturing information on the impact of the school environment may also be valuable. A greater understanding of the interactions of children with other caretakers may also increase the knowledge base on the relationship between child-feeding methods and dietary practices on child weight status. In addition, child care providers like Head Start programs have to meet certain standards and guidelines, which include the dissemination of educational information on dietary practices and nutrition. As part of the mothers' social network and social support in child feeding, additional questions could address maternal perceptions of the challenges they encounter in conforming to or countering child-feeding and dietary practices that their children are exposed to at preschool or under the care of an influential adult. This may also help determine whether the influence of child caregivers and providers on child dietary intake and child feeding have a positive or negative effect on child weight status. In addition, data collection of child dietary intake could be enhanced not only by collecting information from other child caretakers, but by also including visual aids to assist the participants in more accurately determining the serving sizes of foods and beverages consumed

by their children. Comparative analyses could be conducted to determine agreement or discordance with child feeding between mothers and other child caregivers.

Future analyses should also account for sex differences between child participants. Evidence supports that sex differences in child-feeding practices may also impact food intake and weight status. For example, mothers have been found to exercise more control over girls than over boys as a consequence to social pressures for women to be thin (Johnson & Birch, 1994). Girls' and boys' conditioning around body image and food also varies. Mothers are more likely to restrict dietary intake for girls and encourage greater consumption for boys (McCabe et al., 2007). For Latino children, boys who are less acculturated are more likely to be influenced by their siblings' nutritional intake, while girls who are more acculturated are affected by their peers (Diaz et al., 2009). Inclusion of these factors in statistical analyses may uncover additional insight into sex differences in mothers' feeding practices and may help in adapting future educational programming.

M.   **Community Implications: Framing the Context of Puerto Rican Child Health**

Given the alarming rates of obesity (50%) among Latino children in the HP area of Chicago, Illinois (Estarziau et al., 2006), particularly preschool children (Whitman, Williams, & Shah, 2004), it is crucial to direct preventive and research efforts for families and children in this community. In addition, the HP community is predominantly Latino (70%) with Puerto Ricans comprising the largest racial or ethnic group (35%). This is different from the general U.S. population where Puerto Ricans comprise the second largest Latino subgroup. However, much obesity research impacting preventive policies and practices for Latinos is centered on communities of Mexican American descent and aggregates across all Latino subgroups, which

does not allow for uncovering the unique experiences of Puerto Ricans and how these impact health. Thus, findings from these former studies may not be translatable to the lived experiences of Puerto Ricans in an urban setting. Puerto Ricans have higher disease morbidity and mortality and poorer health outcomes than other Latino subgroups for most chronic conditions, many of which have been associated with obesity (e.g., asthma, diabetes, hypertension, CVD, and some cancers) (Kanna et al., 2008; CDC, 2006; Valdez & de Posada, 2006). Evidence demonstrates that racial and ethnic minorities, particularly Latino children, have higher obesity prevalence and greater obesity related complications than their White counterparts, and are at an increased disadvantage because they receive less care (Caprio, 2006). Therefore, it is imperative to focus research and preventive efforts on Puerto Ricans in HP.

In order to understand the lived experiences of the Puerto Rican diaspora, it is important to contextualize the historical presence of Puerto Ricans in the HP area. Puerto Ricans began migrating to the United States as early as the 1860s for employment, education, and political organizing. Puerto Ricans have a history of colonization and oppression as a commonwealth of the U.S. government. In the 1950s, Puerto Rican migration to the Chicagoland area boomed and Puerto Ricans from the island as well as those gentrified from other Chicago neighborhoods like Lincoln Park began to settle in HP (Cruz, 2005). Upon arrival, Puerto Ricans encountered a city that had a very different physical geography from their lived experienced on the island of Puerto Rico (Franchesci, 2012). Despite being U.S. citizens, Puerto Ricans arriving to Chicago and other U.S. cities faced discrimination and poor living and working conditions. They had difficulties securing housing and adequate wages to support their families. For example, Puerto Ricans found themselves continually displaced from housing due to targeted increases in fees for rental units. Even opportunities for Puerto Ricans to worship in Catholic institutions were

compromised as the churches denied them access (Franchesci, 2012). In addition, Puerto Ricans had limited access to produce and foods native to their homeland, and, being in an urban environment, they did not have the space to maintain traditional health-promotion practices like growing their own gardens. Moreover, because of the historical colonial situation between the United States and Puerto Rico, many Puerto Ricans found themselves migrating back and forth to not only visit family, but for the sake of employment opportunities. Thus, this transnational experience has also shaped Puerto Rican dietary habits and affected their health. Therefore, some Puerto Rican families have abandoned some of the cultural eating practices, which consisted of homegrown fruits and vegetables (Houston, 2005). Research indicates that migratory patterns of Puerto Ricans to the United States in the 1940s corresponded with decreased intake of fruits and vegetables (Sanjur, 1995). Therefore, the diet of Puerto Ricans in the United States was influenced by patterns of migration and food industry changes on the island.

In blending food cultures, Puerto Ricans have also become more fast food friendly. In the 1960s and 1970s, the establishment of the U.S. fast food industry in Puerto Rico infiltrated the dietary patterns of natives on the island. Consequently, the Puerto Rican diet shifted from household gardens and fresh produce markets to becoming increasingly dependent on the American economic structure of imported, processed, and canned food products offered at supermarkets (Houston, 2005; Sanjur, 1995). As Puerto Ricans migrated to the United States their dietary patterns continued to transform. In communities like HP, the prevalence of fast food chains along with limited financial resources further compounds the issue of food insecurity (Gallagher, 2006). The findings from this study confirm that most Puerto Rican women and children continue to live in poverty regardless of their level of education. Thus, Puerto Rican families have resorted to eating cheaper foods including fast food that negatively impacts their

health. It is also important to note that anecdotal accounts from participants demonstrate that even when they are willing and/or able to travel to grocers, which provide fresh fruits and vegetables and organic foods, they are not able to purchase them because these establishments do not accept Link cards. Moreover, it is hegemonically ingrained in the Puerto Rican culture that it is healthy to have white rice, refined bread, high-protein foods, sweetened beverages, and fried foods, which parallel overweight and obesity among women of childbearing age (Sanjur, 1995). Therefore, the Puerto Rican diet has become heavily based on refined carbohydrates, starches, sugars, and fats.

Despite the availability of open spaces for children to play in HP, they are not well utilized and do not promote increased physical activity because most adults (66%) perceive these to be unsafe environments (Estarziau et al., 2006). Neighborhood safety concerns appear to increase residents' avoidance of going to parks, walking, and being active. Lack of physical activity and free play for children has been associated with increased obesity risk (CDC, 2006). Latinos born in the United States are more likely to adopt overweight-related behaviors, such as poorer diet and physical inactivity (Lara et al., 2005). Similarly, most HP residents of Puerto Rican descent were U.S.-born. The HPCHS indicates that Puerto Rican children in HP are not very physically active at home or in their school environment (Estarziau et al., 2006). Furthermore, the HPCHS reveals that Puerto Rican children and families have less healthful diets than other Latino counterparts (Estarziau et al., 2006). The Puerto Rican HP community has responded to these disparities in various ways through sociopolitical activism and community engagement.

Since arriving in the Chicago HP community in the 1950s, the Puerto Rican community has evolved and had to continually adapt to issues affecting their built environment (i.e., man-

made spaces that are created and/or modified where people reside, work, and/or recreate) and

their health, including gentrification and limited access to healthy food and green spaces. There

has been a steady stream of nationalist sentiment in the community, which has inspired

community members to embrace their culture and to recognize their collective spirit. For

example, HP community organizers have been able to produce and create many cultural

institutions including the PRCC, an alternative school, social service agencies, and daycare

centers. Community efforts have also emerged more recently out of an awareness of the

prevalence of obesity and its related comorbidities among Puerto Ricans. Examples include the

DEC, the 72-Block-by-Block campaign that canvasses the HP neighborhood to educate the

residents about diabetes, the Muevete! campaign that promotes obesity and diabetes prevention

through physical activity, and the Albizu Campos alternative high school's rooftop garden that

cultivates produce native to Puerto Rico. However, regardless of the critical consciousness of the

community's Puerto Rican identity and the establishment of these cultural institutions and

preventive efforts, obesity and associated conditions continue to disproportionately affect the

Puerto Rican population. Consequently, although the Puerto Rican community in the Chicago

HP area has been very active culturally and politically, the strong hegemonic forces that control

goods and services may have negatively impacted the health and wellness of the neighborhood

along with government subsidies that dictate the foods served at daycare centers. Nonetheless,

the community continues to forge ahead with initiatives to counter food insecurity and obesity

issues with the opening of La Cosecha (The Harvest), a cooperative grocery store that provides

fresh produce and Puerto Rican foods, and La Canasta Básica (The Basic Basket), which delivers

a fresh produce basket on a weekly basis to HP residents along with recipes to encourage home-

cooked traditional Puerto Rican meals. Given the scope of the problem with food adequacy and

obesity in HP, future studies will inform the impact of these community efforts, provide next

steps and directions, and encourage broader public support.

Puerto Ricans have been historically overlooked and marginalized. Despite the

community leaders' health-promotion initiatives, engaging the broader Puerto Rican community

to actively participate in programming continues to pose challenges in combating obesity in HP.

The need for more public health education is not only important but imperative to supplement

and complement the community efforts on alternative nutritional information with regard to

dietary intake, exercise, and lifestyle choices, but particularly in the context of the findings of

this study and the child-feeding practices that promote and prevent obesity in children. As

parents become more aware, it is projected that they will become proactive in changing their

built environment and advocating for quality, affordable foods to be provided at local grocers

and in their children's schools. However, in order to maximize community change efforts,

broader support from clinical partners, academicians, and public health practitioners will be

crucial.

N.   **Public Health Implications**

The Puerto Rican community has been identified as a population with high risk for

obesity and obesity-related diseases. Puerto Ricans in HP encounter greater obstacles in

combating obesity risk, including poor access to fresh produce. Understanding maternal

perceptions and child-feeding practices that deter or promote overweight is important for the

development of appropriate educational interventions, but prior research has focused on coercive

PC feeding practices in relation to obesity measured by child BMI, excluding the potential

health-promoting benefits of CC feeding tactics. Former studies are void of assessing the

relationship between child-feeding strategies in relation to dietary intake, weight status, and acculturation in the context of the Puerto Rican diaspora in the United States. Therefore, the findings from this research can be used as a learning frame to modify existing parenting and nutritional programming by encouraging practices that are health-promoting (e.g., allowing child control) and presenting alternatives to potentially harmful behaviors (e.g., exerting the controlling practices of pressure, restriction, and rewards) in order to maximize obesity prevention efforts among Puerto Ricans.

In addition, it is necessary to acknowledge the importance of cultural influences on health as well as the cultural differences across Latino subgroups. Therefore, this study moves beyond traditional linear models and expands on the literature's concept of acculturation as a multidimensional iterative process of adaptation to and integration of new values, beliefs, and practices when immigrants interact in a new environment (Siatkowski, 2007). Thus, findings will help clinicians (e. g., physicians, nurses, and dietitians) and public health professionals augment the operational meaning of culture and acculturation in the development of services and interventions relevant to Latino health needs. In addition, this study confirms the bicultural experience of Puerto Ricans and provides a greater understanding of the unique acculturative process of Puerto Ricans. As U.S. citizens, Puerto Ricans in particular have a distinctive cultural experience due to their dual immersion in American and Puerto Rican values both on the island and the mainland from an early age. Thus, clinicians and public health professionals will need to be more cognizant of how cultural variations in nutritional practices impact the health and well-being of Puerto Ricans. Specifically, this study contributes to the understanding of how cultural differences in child feeding and dietary intake affect weight status among Puerto Rican children, who are at an elevated risk of becoming overweight and obese.

Obesity is a multifactorial issue and addressing it requires a collaborative effort from multiple partners, including physicians and other clinical staff. Having a greater cultural insight will promote multidisciplinary partnerships between clinicians, public health practitioners, preschool staff, community health workers, and community members in order to establish culturally competent nutritional and educational programs to benefit Puerto Rican families in combating childhood obesity. Given their routine interactions with children during well-child visits, pediatricians are in a position to provide a clinical understanding of child obesity development and prevention as well as to intervene at the early onset of child overweight. However, clinician surveys indicate that physicians feel ill prepared to provide obesity prevention counseling (i.e., nutrition, exercise, and lifestyle changes) and lack the support services for addressing childhood obesity, which are compounded by time constraints during patient visits and lack of reimbursement for critical obesity treatment and preventive education (Caprio, 2006). Additionally, when it comes to treating Latino patients, pediatricians are challenged by the pessimism of being able to motivate change among parents who do not perceive their child as overweight. This may parallel reports that Latino children are under-diagnosed (Caprio, 2006). A paradigm shift is necessary that moves away from blaming individuals and communities for obesity, but that aims to work across disciplines, chiefly with CBOs, and across cultures to tailor strategies for behavior change and address barriers to change.

In addition, nurses are positioned to advocate for families and children in community clinics and school settings. Because they interface more regularly with children and families than other clinicians, nurses have the ability to effect change by providing parent classes on health-promoting practices (e.g., nutrition and child-feeding strategies). Similarly, schools play a critical role in combating obesity by establishing safe and supportive environments through policies and

practices that foster healthy behaviors. Preschool staff have a principal role in child obesity prevention by providing children and families opportunities to learn about and practice healthy eating as well as physical activity behaviors. Like parents, preschool teachers and support staff serve as children's first health educators and role models. Preschool educators can also advocate for quality foods to be served in school lunch programs, particularly in low-income communities like HP.

Clearly, clinicians and preschool staff have an obligation to serve as leaders in the decision-making process, from addressing issues of a toxic built environment to encouraging culturally rooted practices that promote the health and well-being of children. Health practitioners and school staff can help bridge gaps in the imbalances of power and assist in advocating for broader policy change by educating legislators who often lack the knowledge and/or expertise in obesity prevention. However, these efforts would be invalid without the collaborative insight and participation of the leadership and staff of CBOs. Research indicates that individuals learn best from those who are most like themselves with regard to race, social class, and culture (Minkler & Pies, 2006). Therefore, lay health workers will play an influential role as trusted community members who have not only the cultural capital, but the knowledge base to educate families and children. Leadership of CBOs from the PRCC, DEC, and Greater Humboldt Park Community of Wellness, along with community health workers, will also be central in the design and establishment of upstream efforts to impact policy changes. Nonetheless, educational efforts must engage the pipeline of health care professionals as well as community members.

Clinician cultural competence training through accredited continuing education and curriculum modifications for undergraduate and graduate health professions students will be

necessary. Practitioner curricula need to be inclusive of historical perspectives of the Latino and Puerto Rican lived experiences, variations in the acculturative process across Latino subgroups, cultural differences in health practices and perceptions, challenges presented by built environments, and policies as well as strategies for collaborating with communities and patients as partners within the context of Puerto Ricans and other Latino subgroups residing in urban settings like Chicago. In addition, clinician and student education should encompass training on how to prevent and manage an "adult" problem like obesity among children. This includes properly screening patients for overweight and obesity using not only BMI as a measure, but recognizing the importance of using it along with other metrics like WC, which may be more sensitive at detecting obesity risk among Puerto Ricans. In addition, current efforts would be incomplete without education on child-feeding practices employed by Puerto Rican mothers and their effects on child dietary intake and weight status. Using the findings from this study will also enhance the understanding and cultural sensitivity of health care professionals; and it will facilitate the effectiveness of the counseling and educational programming they provide because they will be able to incorporate Puerto Rican cultural preferences while accounting for available resources and challenges posed by the built environment. Increasing the knowledge base of clinicians and community health workers will increase the capacity for community advocacy by supporting and expanding on existing efforts to counter barriers, such as food cooperatives, and farmers markets, like the HP Community Organizing for Obesity Prevention efforts to provide low-sodium, low-fat meals at Puerto Rican restaurants, and to increase fresh produce sold at local grocery and convenience stores, as well as expanding the availability of these through La Cosecha and the rooftop garden. However, the implementation and modification of obesity

prevention activities calls for culturally appropriate efforts that move away from victim-blaming

approaches centered on child weight status.

Research indicates that educational interventions focusing on physical outcomes like

weight loss may be ineffective, given that Latino parents are reluctant to classify their children as

overweight; therefore, programs need to address effective parenting and dietary practices

(Mendoza & Fuentes-Afflick, 1999). According to Golan and Crow (2004), most research

focuses on weight as the outcome, and while it is important to measure, it should not be the

principal goal or factor of the intervention. Investigators also propose a health-centered approach

as being more effective than a weight-centered approach (Golan & Crow, 2004; Mendoza &

Fuentes-Afflick, 1999). For example, the Hip-Hop to Health Jr. program targeting diet and

physical activity among Latino preschool children in Chicago was unsuccessful at reducing BMI

levels (Fitzgibbon et al., 2006). Researchers suggest that greater parental involvement as well as

appropriate cultural tailoring may be valuable for Latinos (Fitzgibbon et al., 2006). Studies

underscore the importance of family centered strategies in working with Latino families (Golan

& Crow, 2004; Mendoza & Fuentes-Afflick, 1999). In addition, parent involvement has been

consistently recognized by Latino families as being instrumental for engaging in health behaviors

(Anderson et al., 2007; Snethen et al., 2007; Crawford et al., 2004), given that as gatekeepers

parents provide the support and resources for children to implement healthy practices (Golan &

Crow, 2004). It is important to also note that parent involvement will be best supported through

an asset-based approach that focuses on the Latino community's assets and capacities in order to

establish successful health-promoting interventions (McKnight & Kretzmann, 2006).

Investigators emphasize the importance of community-based programs that provide education on

healthy eating strategies, particularly how to prepare traditional foods in more healthful ways

(Snethen et al., 2007; Diaz, Mainous, & Pope, 2007; Sherry et al., 2004). Consequently, enlisting parents and community members as the key drivers of interventions will be instrumental in the successful implementation and long-term impact of educational efforts. Preliminary findings from a needs assessment revealed that Puerto Rican mothers from HP are interested in cooking demonstrations (65%), nutritional information (62%), exercise classes (72%), and meal planning workshops (56%). These results in conjunction with other findings from this study can be used as a starting point of reference in tailoring interventions and engaging parents' participation.

O.   **Conclusion**

Studies have found that maternal child-feeding practices influence child dietary habits, which may predispose children to becoming overweight or obese. Among Latina mothers, cultural beliefs may further compound this relationship. However, prior research does not contribute to the understanding of the relationship between maternal-feeding strategies and child weight status (i.e., BMI and WC) among Latinos subgroups. Puerto Ricans have a unique bicultural experience marked by their immersion in both American and Puerto Rican cultures that may shape their health behavior differently from that of other Latino subgroups.

This study determined that Puerto Rican mothers were more likely to employ health-promoting strategies over risky behaviors, which appeared to promote healthier diets. Conversely, maternal practice of health-compromising behaviors contributed to child obesity with girls having a greater risk than boys. The elevated rate of overweight or obese mothers may influence sex differences, impact long-term dietary habits, and predispose children to obesity risk, but only maternal WC percentiles were predictive of child overweight. In addition, biculturality among Puerto Ricans influenced negative child feeding, unhealthy dietary intake, and child overweight in comparison to Puerto Rican-dominant mothers. However, acculturation

did not modify the relationship between child feeding and overweight. Therefore, biculturality may mask the effects of acculturation to American culture among Puerto Ricans. Nonetheless, given the alarming rates of obesity among women and children in HP, further research is warranted to confirm findings from the current study and to inform tailoring culturally appropriate interventions for Puerto Ricans. Unique experiences of Puerto Rican culture may also lend themselves to nontraditional benefits of reward mechanisms when fruits and vegetables are encouraged over energy-dense snacks. Clinicians, preschool staff, public health practitioners, and community organizers should consider developing or modifying existing nutrition educational programs to inform parents about the importance of limiting sweet snacks and sugary drinks, including 100% juice, which is more prevalently consumed by Puerto Ricans. In addition, educational programming should teach parents the benefits of CC, protective feeding strategies to promote healthy behaviors and healthy weight status among children. Furthermore, parents should learn about the counterproductiveness of well-intentioned practices like pressure to eat and the use of unhealthy foods as rewards on child weight status within the context of behaviors that would present health risks for Puerto Rican children.

APPENDICES

SAMPLE OF RECRUITMENT MATERIALS

Early Childhood Health Study

Looking for: Puerto Rican mothers ages 18 to 44 residing in the Humboldt Park community with at least one child aged 2 to 5 years who are available for one time in-person administered survey.

Participants will receive compensation for their time.

For more information contact Lisa Aponte-Soto: lapont2@uic.edu or 708.890.7942

This Project is endorsed by the Puerto Rican Cultural Center, the Greater Humboldt Park Community of Wellness, and the Greater Humboldt Park Diabetes Empowerment Center.

UIC SCHOOL OF
UNIVERSITY OF ILLINOIS AT CHICAGO **PUBLIC HEALTH**

Flyer_Version 2, 4/12/11 – UIC

APPENDIX B

LETTERS OF SUPPORT

Lutheran Social Services of Illinois

Trinidad Lutheran Head Start
2921 West Division Street
Chicago, Illinois 60622
773.278.9332
or 773.278.9333
773.278.9356   Fax

Emma Emilia Espinal
Site Director

May 7, 2010

Lisa Aponte-Soto, MHA
Division of Community Health Sciences
University of Illinois at Chicago
School of Public Health

Dear Ms. Aponte-Soto:

I am writing to support your dissertation project "The Impact of Puerto Rican Maternal Child-Feeding Practices on Early Childhood Obesity Prevention" in collaboration with the University of Illinois at Chicago, School of Public Health. The Trinidad Lutheran Head Start is one of five accredited Head Start programs offered by Lutheran Social Services of Illinois (LSSI) for children ages 3 to 5 in the Humboldt Park community. Programming is designed to develop students' social skills and school readiness. The curriculum covers the ABCs, numbers, shapes, colors, counting, computers, early math, reading and science, table manners, nutrition, tooth-brushing, socialization skills and much more.

The LSSI programs extend services to families with poverty level incomes from Chicago's most economically disadvantaged neighborhoods (Humboldt Park, North Austin, Rogers Park, Uptown and West Englewood).LSSI's commitment to community wellness is exemplified by our mission: Responding to the Gospel, Lutheran Social Services of Illinois brings healing, justice and wholeness to people and communities. Our programs are designed to meet these goals. The Head Start services at Trinidad Lutheran are aligned our LSSI mission and services by offering a variety of social, education, and supportive services to promote the health and well-being of young children and their parents. We believe that the "Early Childhood Obesity Prevention" assessment for Puerto Rican mothers and young children will complement our services and facilitate the development of preventive education and services that are gravely needed in our community and we are excited to be a part of this initiative.

If you have any questions or need additional information, please contact me at 773.278.9332 or 773.278.9333.

Sincerely,

Emma Emilia Espinal
Site Director
Trinidad Lutheran Head Start

May 7, 2010

Lisa Aponte-Soto, MHA
Division of Community Health Sciences
University of Illinois at Chicago
School of Public Health

Dear Ms. Aponte-Soto:

This letter is in support of project assessing "The Impact of Puerto Rican Maternal Child-Feeding Practices on Early Childhood Obesity Prevention" in collaboration with the University of Illinois at Chicago School of Public Health. Casa Central is an acclaimed model agency established by a multidimensional group of churches in 1954 with the primary goal of providing social services to the Hispanic population across the life course. Since its inception, Casa Central has demonstrated a commitment to quality services towards improving the quality of life and building a stronger, healthier community with proper consideration of the various values, languages and cultures existing in the community. The Casa Central Child Development Program, in particular, offers low income families, on-site early childhood education services for children ages 2 to 5 years old to assure that parents that their child will be well taken care of so that they can participate in full-time work or educational advancement training. The program is dedicated to fostering connections between families, children, staff and communities and facilitating the children's developmental growth to their fullest potential.

Currently, diabetes and obesity plague our community and is a threat to both children and adults. We have been making a concerted effort through our wellness campaign to reach out to those at greatest risk. The "Early Childhood Obesity Prevention" initiative for Puerto Rican families complements our commitment to healthy lifestyle and wellness in the Humboldt Park community. There is a need for identifying health promoting behaviors in addition to preventable risky behaviors that contribute early childhood obesity and lifestyle dietary habits. Casa Central serves the residents of Humboldt Park and is predominantly populated by families of Puerto Rican, Mexican, African American and other Latino nationalities with over 50% of community members living below twice the poverty level. In addition, nearly 20% of our residents are immigrants with 56% of these individuals speaking a language other than English at home.

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The "Early Childhood Obesity Prevention" project will facilitate the development of future services that will be instrumental in eradicating obesity throughout the life course in our community. Thus, we are excited to be a part of this initiative.

Sincerely,

Mary Beth Cole
Family Support/ Parent Involvement Coordinator

Casa Central Children's Services

CHICAGO YOUTH CENTERS

CYC

CARING FOR YOUNG CHICAGO

Centro Nuestro
3222 W. Division
Chicago, IL. 60651
Phone: 773-489-3157
Fax: 773-489-3376

May 14, 2010

Lisa Aponte-Soto, MHA
Division of Community Health Sciences
University of Illinois at Chicago
School of Public Health

Dear Ms. Aponte-Soto:

This letter is in support of "The Impact of Puerto Rican Maternal Child-Feeding Practices on Early Childhood Obesity Prevention" project in collaboration with the University of Illinois at Chicago School of Public Health. The Centro Nuestro Head Start Program, a part of the Chicago Youth Centers (CYC), provides high-quality full-day and half-day pre-kindergarten programs for children aged 3-5 in the Humboldt Park community. CYC Centro Nuestro in Humboldt Park offers a Continuum of Caring, with well-trained youth-development specialists giving individual attention to youth to help them with academic achievement and social and life skills development as well as physical/nutritional and emotional foundation for entry into kindergarten. Following the Positive Youth Development model, the goal is to give members the tools, support, and guidance they need to reach their full potential through the following age-specific programs.

CYC Centro Nuestro provides affordable support services to families. The Humboldt Park service community is predominantly populated by working families of Puerto Rican, Mexican, African American and other Latino nationalities with over 50% of community members living below twice the poverty level. We serve a significant Spanish-speaking immigrant population; thus, we offer bilingual education. Diabetes and obesity impacts our community disproportionately, particularly Puerto Rican families.

As part of our commitment to building healthy families, we have incorporated physical education as part of our curriculum and offer healthy meals. In addition, CYC Centro Nuestro encourages parents to be actively involved in the classroom and offers parent-child days, home visits, newsletters and workshops on parenting issues to build bridges between the program and the home. Moreover, there is a grave need for uncovering healthy habits as well as those behaviors that contribute early childhood obesity and lifestyle dietary habits. The "Early Childhood Obesity Prevention" project for Puerto Rican families complements our commitment to healthy lifestyle and wellness at CYC-Centro Nuestro and will foster opportunities for tailoring programs that will be facilitate eliminating obesity in our community.

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We are excited to be a part of this initiative and working together towards the development of preventive health programs. Please do not hesitate to contact me if you have questions or need additional information. I can be reached at (773)489-3157 or lorena.mejia@chicagoyouthcenters.org.

Sincerely,

Lorena Mejia
Social Service Worker
Chicago Youth Centers, Centro Nuestro

Centro Infantil Consuelo Lee Corretjer
2739-41 W. Division Street • Chicago IL 60622 • v. 773/342.8866 • f. 773/342.6609
centroinfantil@prcc-chgo.org • www.prcc-chgo.org

Celebrating 25 Years of Serving the Community 1980-2005

May 13, 2010

Lisa Aponte-Soto, MHA
Division of Community Health Sciences
University of Illinois at Chicago
School of Public Health

Dear Ms. Aponte-Soto:

I am writing to support the community project for assessing "The Impact of Puerto Rican Maternal Child-Feeding Practices on Early Childhood Obesity Prevention" in collaboration with the University of Illinois at Chicago School of Public Health. The Consuelo Lee Corretjer Centro Infantil (the Center), a program of the Puerto Rican Cultural Center founded in 1980 in partnership with El Valor, provides childcare/Head Start services for children from 15 months to 5 years of age. Responding to the need for bilingual-bicultural pre-school education, the program offers a bilingual curriculum that is rooted in the principles of cultural empowerment including Getting to know Puerto Rico, Mexico, and Latin America through traditional customs, songs, cuisine and dances. In addition, children are not only immersed in pre-reading in both Spanish and English, but they are also engaged on a daily basis in social studies, health and safety, mathematics, art and music, science and computer skills through active and quite activities as well as free play. Children's individual potential and capacity is nurtured to the fullest extent to assist them in transitioning to elementary school, and most importantly to have a trajectory of lifelong experiential, self-actualized learning to impact their communities and the world. Recognizing the importance of parental involvement in child development, the Center fosters relationships with the parents by providing them opportunities to participate in the entire process of program development. Thus, the Center's staff maintains ongoing communication and work closely with parents to increase their awareness and knowledge base with all aspects that support child development under the premise of child human rights and capabilities.

The Consuelo Lee Corretjer Centro Infantil predominantly serves working families residing in the Humboldt Park community, which is predominantly populated by families of Puerto Rican, Mexican, African American and other Latino nationalities with over 50% of community members living below twice the poverty level. In addition, nearly 20% of our residents are immigrants with 56% of these individuals speaking a language other than English at home. Currently, diabetes and obesity plague our community and is a threat to families across the life continuum.

As part of our commitment to building healthy families, we have actively participated in wellness initiatives including the 72 Block-By-Block diabetes campaign and the establishment of the Empowerment Center. Needless to say, there is a need for identifying health promoting behaviors in addition to preventable risky behaviors that contribute early childhood obesity and lifestyle dietary habits. The "Early Childhood Obesity Prevention" initiative for Puerto Rican families complements our commitment to healthy lifestyle and wellness in the Humboldt Park community. In addition, the project will facilitate the development of future services that will be instrumental in eradicating obesity throughout the life course in our community. Thus, we are excited to be a part of this initiative and look forward to working together to utilize the findings in support of advancing preventive health initiatives.

Sincerely,

Xochitl Ramírez
Program Director

THE
Puerto Rican Cultural Center

www.prcc-chgo.org

2739-41 W. Division Street • Chicago IL 60622 • p: 773/342-8023 f: 773/342-6609

May 7, 2010
Lisa Aponte-Soto, MHA
Division of Community Health Sciences
University of Illinois at Chicago
School of Public Health

Dear Ms. Aponte-Soto:

I am writing to support your dissertation project "The Impact of Puerto Rican Maternal Child-Feeding Practices on Early Childhood Obesity Prevention" in collaboration with the University of Illinois at Chicago, School of Public Health. Founded in 1973 by community activists, the Juan Antonio Corretjer Puerto Rican Cultural Center (PRCC) is a non-profit community-based grassroots, educational, health and cultural services organization founded on the principles of self-determination, self-actualization and self-sufficiency that is activist-oriented. Our long standing commitment of service is exemplified by our philosophy, "Vivir y ayudar a vivir" or "To live and help live".

The PRCC addresses fundamental needs in the Puerto Rican/Latino communities of Humboldt Park, Logan Square and Hermosa Park. Our programs include an HIV and STD education and prevention program, a bilingual-bicultural daycare, an award-winning alternative high school, a young women's literacy program, a community library and information center, an obesity prevention program as well as sponsoring three major annual events – a community parade, the Midwest's largest Latino musical festival, a haunted community strip, and a winter festival.

All of the PRCC's programs encourage participants to think critically about their reality and to promote an ethics of self-reliance based on social responsibility. They deal with health, social, and cultural issues that affect Puerto Rican/Latino and poor communities, such as AIDS, education, literacy, housing, homophobia, drug addiction, gang violence, teen pregnancy, police brutality, racism, economic and community development and human rights violations.

In addition, the PRCC is involved in developing innovative programs that will enhance and improve the health of our residents in a sustainable way through community and school gardens, walk-ability and experience programs, and nutrition initiatives. Currently, the PRCC partners with over 75 community, university, local businesses, corporate, municipal, state and federal entities to raise awareness of obstacles in the way of the community's stability and well-being. We believe that the "Early Childhood Obesity Prevention" assessment for Puerto Rican mothers and young children will facilitate the development of preventive education and services that will be integral in our community and we look forward to being a part of this initiative.

Feel free to contact me at 773.278.6738 with questions or for additional information.

Sincerely,

José E. López
Executive Director

FOUNDED IN 1973

SINAI URBAN HEALTH INSTITUTE

A proud member of Sinai Health System

CALIFORNIA AVE. AT 15TH STREET
ROOM K-435
CHICAGO, IL 60608-1797
TEL. (773) 257-5960
FAX. (773) 257-5680

June 23, 2010

Lisa Aponte-Soto, MHA
Division of Community Health Sciences
University of Illinois at Chicago
School of Public Health

Dear Ms. Aponte-Soto:

I am writing to strongly support your dissertation project "The Impact of Puerto Rican Maternal Child-Feeding Practices on Early Childhood Obesity Prevention" in collaboration with the University of Illinois at Chicago, School of Public Health.

Block-By-Block: The Greater Humboldt Park Community Campaign Against Diabetes is a NIH funded highly visible community lead study/intervention to prevent and control Type2 diabetes for the people of Greater Humboldt Park and surrounding neighborhoods. Since Type 2 diabetes is impacted by both physiological and social determinants of health, the Campaign is part of a multi-level approach that will bring together an academic health center (Rush/Sinai), community based organizations, local health resources (clinics, Norwegian American Hospitals) and neighborhood residents. The Campaign will inform, advocate, and empower residents -- regardless of literacy, language, insurance status, or income – to reduce the health risks associated with diabetes. Working together, we believe we will reduce the devastation caused by diabetes in our community.

Needless to say, obesity as a major risk factor for diabetes is something we seek to prevent and control as early as possible. I believe that the "Early Childhood Obesity Prevention" assessment for Puerto Rican mothers and young children will contribute to the development of preventive education and public health services that can help prevent obesity and related diseases such as diabetes . My staff and I look forward to working with you on this important project.

Feel free to contact me at (773) 342-0855, if I can of any further help.

Sincerely,

Jaime Delgado
Project Director
Block-By-Block Project
Sinai Urban Health Institute

WWW.SUHICHICAGO.ORG

The Greater Humboldt Park Community of Wellness
1116 North Kedzie Chicago IL 60651

Phone # 773-772-8240   Fax# 773-384-0560

STEERING COMMITTEE

Miguel Palacio
Association House of Chicago (Co-Chair)

Madeline Roman
Humboldt Park Vocational Education Center Wright College (Co-Chair)

Lee Francis
Erie Family Health Center

Christy Prahl
Bickerdike Redevelopment Corporation

José Lopez
Puerto Rican Cultural Center

Eliud Medina
Near Northwest Neighborhood Network/HPEP

Irma Pacheco
Centro San Bonifacio

José Luis Rodríguez
CO-OP Humboldt Park

Janece Simmons
West Humboldt Park Family and Community Development Council

Steve Whitman
Sinai Urban Health Institute

May 10, 2010

Lisa Aponte-Soto, MHA
Division of Community Health Sciences
University of Illinois at Chicago
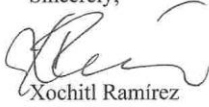School of Public Health

Dear Ms. Aponte-Soto:

This letter is in support of "The Impact of Puerto Rican Maternal Child-Feeding Practices on Early Childhood Obesity Prevention" project in collaboration with the University of Illinois at Chicago School of Public Health. The

As you know, the Greater Humboldt Park Community of Wellness was founded in 2005 as a coalition of community-based organizations to develop a healthy Humboldt Park. The Community of Wellness represents over sixty community based organizations, serving residents of Chicago's historical Puerto Rican community of Humboldt Park, and includes hospitals, universities, community health centers, social service agencies, and a wide variety of community based organizations large and small. The Community of Wellness' mission is to facilitate a comprehensive vision of wellness in the greater Humboldt Park community by working collaboratively with a broad array of people and organizations to leverage their complementary strengths and capabilities to solve community health problems. The Community of Wellness has eight task forces, which includes the "Active Lifestyles Task Force". This particular task force addresses obesity, overweight, and physical inactivity. Those are all risk factors for diabetes and heart disease, which disproportionately impacts our community, particularly Puerto Rican families.

The "Early Childhood Obesity Prevention" project for Puerto Rican families complements our commitment to healthy lifestyle and wellness in Greater Humboldt Park and will foster opportunities for tailoring current community-wide programs and project that will be facilitate reducing the impact of obesity and physical inactivity in our community.

We are excited to be a part of this initiative and working together towards the development of preventive health programs. Please do not hesitate to contact me if you have questions or need additional information. I can be reached at (773)772-8240 or juanaballesteros@hotmail.com.

Sincerely,

Juana Ballesteros

Juana Ballesteros, BSN RN MPH
Executive Director
Greater Humboldt Park Community of Wellness

Improving Health through Community Leadership, Collaboration and Culture

Association House of Chicago

1116 North Kedzie Avenue • Chicago, IL 60651
773-772-7170 • Fax 773-384-0560

May 7, 2010

Lisa Aponte-Soto, MHA
Division of Community Health Sciences
University of Illinois at Chicago
School of Public Health

Dear Ms. Aponte-Soto:

I write in support of "The Impact of Puerto Rican Maternal Child-Feeding Practices on Early Childhood Obesity Prevention" project in collaboration with the University of Illinois at Chicago, School of Public Health. The Association House was established in 1899 to serve as a community resource to help families help themselves. Association House programs have adapted with each changing era to meet the current communities' needs. Association House's alternative high school, El Cuarto Año (ECA) gives dropouts a second chance. ECA's mission is to create a safe environment in which intellectual curiosity can be explored within a community of learners. ECA is affiliated with the Youth Connection Charter School.

ECA serves students ages 17-21, in the Greater West Town area with a sizeable proportion of students who are young, low-income mothers utilizing the various day care and head start services available in the Humboldt Park community. ECA is committed to services facilitating access to the social services provided by Association House of Chicago for students and their families in supporting their overall wellbeing. We believe that the "Early Childhood Obesity Prevention" project will support the development of preventive education and services for Puerto Rican mothers and young children that are seriously needed in our community. Many of the Humboldt Park residents live twice below the poverty level and are affected by issues of obesity and obesity-related illnesses like diabetes. Thus, we are excited to be a part of this initiative in developing interventions that will support healthy lifestyles and families in Humboldt Park.

If you have any questions or need additional information, please contact me at (773) 772-7170.

Sincerely,

Edward R. Peacock
Principal

October 26, 2011

Lisa Aponte-Soto, MHA
Division of Community Health Sciences
University of Illinois at Chicago
School of Public Health

Dear Ms. Aponte-Soto:

This letter is in support of your dissertation research entitled "The Impact of Puerto Rican Maternal Child-Feeding Practices on Early Childhood Obesity Prevention" being conducted as part of your doctoral studies at the University of Illinois at Chicago School of Public Health. Erie Neighborhood House/La Casa Erie offers a bilingual/bicultural, developmentally appropriate care for more than 400 children annually from six weeks to 5 years old through the Family Child Care Homes network (6 weeks to 5 years old), the Preschool Program including Head Start and State Pre-Kindergarten At Risk (2 to 5 years old). We offer full-day, year-round care that is child-centered and culturally appropriate for nearly 300 children annually. Our preschool program features hands-on activities, expressive arts, regular field trips, literacy and bilingual language development.

Erie House is a vital resource for working parents earning less than 50 percent of the median income in Illinois. Erie House is accredited by the National Association for the Education of Young Children. We provide affordable, high-quality child care for low-income families in the Chicago metropolitan area including the neighborhoods of in the West Town, Humboldt Park, Wicker Park, Bucktown and Logan Square communities among others. The Erie House Head Start Program is aligned with our mission and commitment to promote a just and inclusive society by strengthening low-income, primarily Latino families through skill-building, access to critical resources, advocacy and collaborative action. We believe that the "Early Childhood Obesity Prevention" assessment for Puerto Rican mothers and young children will complement our services and facilitate the development of preventive education and services that are needed in our community.

If you have any questions or need additional information, please contact me at 312-563-5800 ext. 1160 or 312-432-2290.

Sincerely,

Grace Clear

Grace Clear
Associate Director
Childcare Department
Erie Neighborhood House

1701 West Superior St.
Chicago, IL 60622
Tel 312.563.5800
Fax 312.563.5810

1347 West Erie
Chicago, IL 60642
Tel 312.666.3430
Fax 312.666.3955

LEARN.LEAD.CREATE COMMUNITY

WWW.ERIEHOUSE.ORG

St. Sylvester Catholic School

3027 W. Palmer Square • Chicago, IL 60647
(773) 772-5222

October 24, 2011

Lisa Aponte-Soto, MHA
Division of Community Health Sciences
University of Illinois at Chicago
School of Public Health

Dear Ms. Aponte-Soto:

This letter is in support of your dissertation research project "The Impact of Puerto Rican Maternal Child-Feeding Practices on Early Childhood Obesity Prevention" in collaboration with the University of Illinois at Chicago, School of Public Health. The St. Sylvester School offers preschool through 8th grade education and thus provides services to children ages 3 to 5 with nearly 270 students served. Programming is designed to develop students' social skills and school readiness. We offer progressive reading education, 1-1 instruction, a state of the art technology lab, sacramental preparation, sports teams, after school clubs, and an instrumental music program. Our school aims to educate students holistically.

The St. Sylvester programs has over 100 years of extending services to families in the Logan Square community and its surrounding neighborhoods of Humboldt Park, West Town, Avondale, Hermosa and Bucktown. St. Sylvester values the wellness of our students and their families. Our programs are designed to meet these goals. We believe that the "Early Childhood Obesity Prevention" assessment will complement our services and facilitate the development necessary preventive services and education our community. We look forward to supporting this initiative.

If you have any questions or need additional information, please contact me at 773.772.5222 ext. 108.

Sincerely,

Daniel Bennett
Principal
St. Sylvester School

PARTICIPANT FLOW CHART

(Friedman, Furberg, & DeMets, 1998)

| Recruitment |

Enrollment

| Eligible but
not enrolled |

| Study Sample—Puerto Rican
Chicago mothers with children ages
2 to 5 years residing in the Humboldt
Park community |

Consented

| Refused to
give written
consent |

| Administer Survey
and Collect
Measurements |

| Analysis and Dissemination of Results |
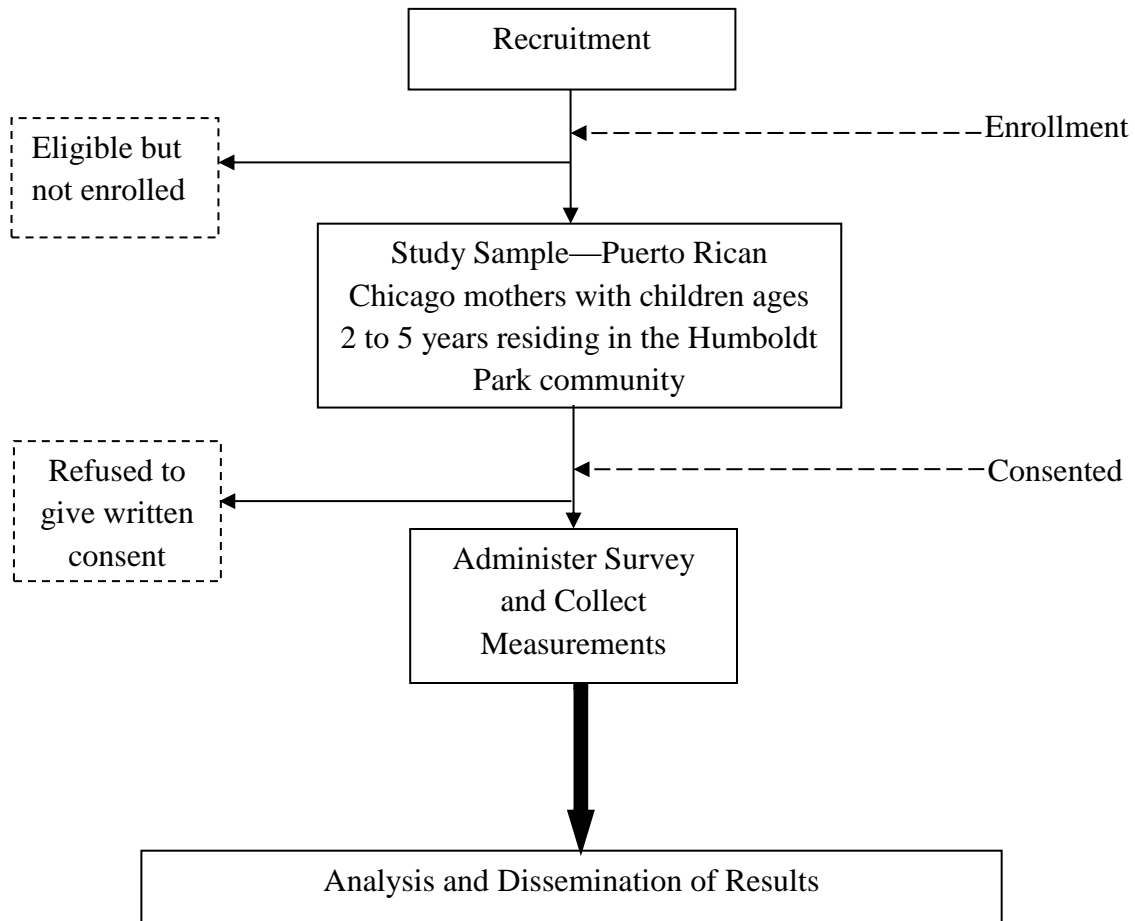
Figure 54. Flow chart of the participant pathway.

Early Childhood Health Practices Questionnaire

Lisa Aponte-Soto

UIC, School of Public Health

Division of Community Health Sciences

Interview ID#_____

Date: _____/_____/_____   Interviewer initials: _____

Start Time: _____:_____   End Time: _____:_____

Participant's Name: _____

Site: _____

Interview ID#_____

Questionnaire Script

WELCOME PARTICIPANT AND THANK YOU FOR ATTENDING. Hello, my name is _____. I am PhD student at UIC and I will be administering the Early Childhood Health Survey today.

The purpose of this survey is to learn about your experiences as a Puerto Rican mother with caring for and feeding your child. We will also ask you questions about your values and experiences as an American and as a Puerto Rican. And, we will ask you about your family background and history. Once we have completed the survey, we will measure height, weight, and waist circumference for you and your child.

Your participation is voluntary. Your responses will be completely confidential. We will not share any information that will make it possible to associate you with the study or your answers.

The approximate time to complete this survey will be 20 minutes. Then, we will collect height and weight information from you and your child. Upon completion, you will receive a $20 gift certificate from Target and your child will receive a gift bag.

Do you want to participate?

IF THEY AGREE, BEGIN WITH THE FIRST QUESTION ON CHILD FEEDING:

Thank you for agreeing to participate. We will mostly be asking questions, unless otherwise stated, about your experiences feeding your child and what your child eats. I will be asking you questions and writing down your responses as we go along. You may ask me to repeat a question at any time. You may also decline to answer a question or skip a particular question.

IF THEY DON'T AGREE, STOP: Thank you for your time.

AT THE END OF THE INTERVIEW: Thank you very much for your time. We will use the information you have shared with us to improve the child health and nutrition education.

If you have any questions about this project, you may contact Lisa Aponte-Soto at lapont2@uic.edu.

Interview ID#_____

Maternal Child-Feeding Practices Questionnaire (CFPQ)
(Musher-Eizenman & Holub, 2007)

Questions regarding child-feeding practices

Parents take many different approaches to feeding their children and may have different concerns about feeding depending on their child. **Please answer the following questions as honestly as possible with this child in mind.**

	Never	Rarely	Sometimes	Mostly	Always
1. How much do you keep track of the sweet snacks (candy, ice cream, cake, pies, pastries, cookies, doughnuts, Twinkies, galletas) that your child eats?	1	2	3	4	5
2. How much do you keep track of the salty snack food (potato chips, Doritos, cheese puffs, plantain chips) that your child eats?	1	2	3	4	5
3. How much do you keep track of the high-fat foods that your child eats?	1	2	3	4	5
4. How much do you keep track of the sugary drinks (soda/pop, kool-aid, Gatorade, Tampico, Malta) your child drinks?	1	2	3	4	5
5. How much do you let your child eat whatever s/he wants?	1	2	3	4	5
6. At dinner, how much do you let your child choose the foods s/he wants from what is served?	1	2	3	4	5
7. When your child gets fussy, how much is giving him/her something to eat or drink the *first* thing you do?	1	2	3	4	5
8. How much do you give your child something to eat or drink if s/he is bored even if you think s/he is not hungry?	1	2	3	4	5
9. How much do you give your child something to eat or drink if s/he is upset even if you think s/he is not hungry?	1	2	3	4	5
10. If your child does not like what is being served, how much do you make something else?	1	2	3	4	5
11. How much do you allow your child to eat snacks whenever s/he wants?	1	2	3	4	5
12. How much do you allow your child to leave the table when s/he is full, even if your family is not done eating?	1	2	3	4	5
13. How much do you encourage your child to eat healthy foods before unhealthy ones?	1	2	3	4	5

Interview ID#_____

	Disagree	Slightly Disagree	Neutral	Slightly Agree	Agree
14. Most of the food I keep in the house is healthy.	1	2	3	4	5
15. I involve my child in planning family meals.	1	2	3	4	5
16. I keep a lot of salty snack foods (potato chips, Doritos, cheese puffs, plantain chips, crackers) in the house.	1	2	3	4	5
17. My child should always eat all of the food on his/her plate.	1	2	3	4	5
18. I have to be sure that my child does not eat too many high-fat foods.	1	2	3	4	5
19. I offer my child his/her favorite foods in exchange for good behavior.					
20. I allow my child to help prepare family meals.	1	2	3	4	5
21. If I did not guide or regulate my child's eating, s/he would eat too much of her/his favorite foods.	1	2	3	4	5
22. A variety of healthy foods (fruits, veggies, grains, etc.) are available to my child at each meal served at home.	1	2	3	4	5
23. I offer sweets (candy, ice cream, cake, pastries, cookies, doughnuts, Twinkies, galletas) to my child as a reward for good behavior.	1	2	3	4	5
24. I encourage my child to try new foods.	1	2	3	4	5
25. I discuss with my child why it's important to eat healthy foods.	1	2	3	4	5
26. I tell my child that healthy food tastes good.	1	2	3	4	5
27. I encourage my child to eat less so s/he won't get fat.	1	2	3	4	5
28. If I do not guide or regulate my child's eating, s/he would eat too many junk foods.	1	2	3	4	5
29. I give my child small helpings at meals to control his/her weight.	1	2	3	4	5
30. If my child says, "I'm not hungry," I try to get him/her to eat anyway.	1	2	3	4	5
31. I discuss with my child the nutritional value of foods.	1	2	3	4	5
32. I encourage my child to participate in grocery shopping.	1	2	3	4	5
33. If my child eats more than usual at one meal, I try to restrict his/her eating at the next meal.	1	2	3	4	5
34. I restrict the food my child eats that might make him/her fat.	1	2	3	4	5
35. There are certain foods my child shouldn't eat because they will make him/her fat.	1	2	3	4	5
36. I withhold sweets/dessert from my child in response to bad behavior.	1	2	3	4	5

Interview ID#_____

	1	2	3	4	5
37. I keep a lot of sweet snacks (candy, ice cream, cake, pies, pastries, cookies, doughnuts, Twinkies, galletas) in my house.	1	2	3	4	5
38. I encourage my child to eat a variety of foods.	1	2	3	4	5
39. If my child eats only a small helping, I try to get him/her to eat more.	1	2	3	4	5
40. I have to be sure that my child does not eat too much of his/her favorite foods.	1	2	3	4	5
41. I don't allow my child to eat between meals because I don't want him/her to get fat.	1	2	3	4	5
42. I tell my child what to eat and what not to eat without explanation.	1	2	3	4	5
43. I have to be sure that my child does not eat too many sweets (candy, ice cream, pies, pastries, cookies, doughnuts, Twinkies, galletas) in my house.	1	2	3	4	5
44. I model healthy eating for my child by eating healthy (fruits, vegetables, grains, etc.) foods myself.	1	2	3	4	5
45. I often put my child on a diet to control his/her weight.	1	2	3	4	5
46. I try to eat healthy foods in front of my child, even if they are not my favorite.	1	2	3	4	5
47. I try to show enthusiasm about eating healthy foods.	1	2	3	4	5
48. I show my child how much I enjoy eating healthy foods.	1	2	3	4	5
49. When s/he says s/he is finished eating, I try to get my child to eat one more (two more, etc.) bites of food.	1	2	3	4	5

Questions regarding your child's dietary intake

California Health Interview Survey (CHIS) 2009 Child Questionnaire Version 5.1 (2010)

Now I'm going to ask you about the foods your child ate yesterday, including meals and snacks.

50.   Yesterday, how many glasses or boxes of 100% fruit juice, such as orange or apple juice, did (CHILD) drink?

[IF NEEDED, SAY: "Only include 100% fruit juices."]
[PART OF A GLASS COUNTS AS 1 GLASS, ASK R TO ESTIMATE NUMBER OF GLASSES IF DRINKING FROM A BOTTLE, CAN, OR CARTON.]

_____GLASSES
o   Refused
o   Don't Know

Interview ID#_____

51.   Yesterday, how many servings of fruit, such as an apple or a banana, did {he/she} eat?

[IF NEEDED, SAY: "Servings are self-defined. A serving is the child's regular portion of this food."]

_____SERVINGS
○   Refused
○   Don't Know

52.   Yesterday, how many servings of French fries, home fries, or hash browns did (CHILD) eat?

[IF RESPONDENT ASKS, SAY: "Do not include potato chips."]

_____SERVINGS
○   Refused
○   Don't Know

53.   Yesterday, how many servings of other vegetables like green salad, green beans, or potatoes did {he/she} have? Do not include fried potatoes.

_____SERVINGS
○   Refused
○   Don't Know

54.   Yesterday, how many glasses or cans of soda, such as Coke, or other sweetened drinks, such as fruit punch or sports drinks did {he/she} drinks? Do <u>not</u> count diet drinks.

[THIS ALSO INCLUDES ANY DRINKS WITH ADDED SUGAR, SUCH AS SUNNY DELIGHT, ICED TEA DRINKS, TAMPICO, HAWAIIN PUNCH, CRANBERRY COCKTAIL, HI-C, SNAPPLE, SUGAR CANE JUICE, GATORADE, SWEETNED WATER DRINKS, AND ENERGY DRINKS.]

_____GLASSES, CANS, OR BOTTLES
○   Refused
○   Don't Know

Interview ID#_____

55. Yesterday, how many servings of sweets such as cookies, candy, doughnuts, pastries, cake, or popsicles did {he/she} have?

[IF NEEDED, SAY: "Include pies and ice cream. Do not include sugar-free kinds, but include low-fat kinds."]

_____SERVINGS
○ Refused
○ Don't Know

56. Now think about the past week. In the past 7 days, how many times did {he/she} eat fast food? Include fast food meals eaten at school or at home, or at fast food restaurants, carryout, or drive thru.

[IF NEEDED, SAY: "Such as food you get at McDonald's, KFC, Panda Express or Taco Bell."]

_____TIMES
○ Refused
○ Don't Know

Questions regarding health status for you and your child

Quality of Life Short Form-12® (Ware, Kosinki, & Keller, 1996)

2005–2006 Early Childhood Questionnaire (CDC, 2007b)

The following questions are about your child's health and your own. Please answer these as honestly as possible.

57. How would you describe your child's overall health status? Would you say that his/her health is:
○ Excellent
○ Very good
○ Good
○ Fair
○ Poor
○ Refused
○ Don't know

Interview ID#_____

58.   How would you describe your overall health status?
- ○   Excellent
- ○   Very Good
- ○   Good
- ○   Fair
- ○   Poor
- ○   Refused
- ○   Don't know

59.   Are you concerned about your child's weight?
- ○   Yes
- ○   No
- ○   Refuse
- ○   Don't know

60.   Do you consider your child to be:
- ○   Overweight
- ○   Underweight
- ○   About the right weight Refused
- ○   Don't know

61.   Has your child been diagnosed with any of the following:
- ○   Being overweight
- ○   Asthma
- ○   Diabetes
- ○   Depression
- ○   Any other medical issues, please specify _____
- ○   Refused
- ○   Don't know

Questions regarding family composition and social support

The following questions regarding your family composition and support you may receive from others in caring and feeding your child. Remember to keep the participating child in mind as you answer these questions. Please answer these as honestly as possible.

62.   How many people live in your household? _____

63.   How many children do you have? _____

Interview ID#_____

64.   What are the ages and gender for each of your children (*from youngest to oldest*) including the participating child?   (*circle participating child*)

Child	Age of child	Sex of child (M/F)
1		
2		
3		
4		
5		

65.   Who is the primary caretaker for the participating child? _____

66.   Does anyone in your household besides you assist with the following for the participating child?
   ○   Feeding your child
      ○   Yes
      ○   No
   ○   Prepare the meals that your child eats
      ○   Yes
      ○   No
   ○   Monitoring what your child eats
      ○   Yes
      ○   No

67.   Do you have family meals together?
   ○   Yes
   ○   No

68.   How many meals a day does your family typically eat together?
   ○   None
   ○   One
   ○   Two
   ○   Three
   ○   Refuse
   ○   Don't know

69.   Who typically shops for food in your family? _____

Interview ID#_____

Questions regarding acculturation to American and Puerto Rican culture

Biculturality Acculturation Scale for Puerto Ricans (Cortes, Rogler, & Malgady, 1994)

Now, I am going to ask you a few questions regarding how much you identify with American and Puerto Rican culture. Please select the alternative that best describes you.

70. How much do you enjoy speaking Spanish?
    tremendous enjoyment 1
    quite a bit of enjoyment 2
    not too much enjoyment... 3
    no enjoyment... 4
    don't speak Spanish 5

71. How much are (participant's nationality) values a part of your life?
    very much a part 1
    a good part 2
    a small part.. 3
    no part at all 4

72. How many days a week would you like to eat Puerto Rican food?_____

73. How proud are you of being Puerto Rican?
    very proud.. 1
    fairly proud 2
    not too proud... 3
    not proud at all 4
    I feel ashamed 5

74. How comfortable would you be in a group of Puerto Ricans who don't speak English?
    very comfortable 1
    fairly comfortable.. 2
    not too comfortable 3
    not comfortable at all 4

Interview ID#_____

75. How important is it to you to raise your children with Puerto Rican values?
very important..1
fairly important 2
not too important...3
not important at all 4

76. With respect to kindness and generosity, do you think Puerto Ricans are:
very kind and generous 1
fairly kind and generous..2
a little kind and generous 3
not kind and generous at all 4

77. How important would it be to you for your children to have all Puerto Rican friends?
very important..1
fairly important 2
not too important...3
not important at all 4

78. How much do you enjoy Spanish TV programs?
very much 1
quite a bit 2
not too much 3
not at all 4

79. How important is it to you to celebrate holidays in the Puerto Rican way?
very important..1
fairly important 2
not too important...3
not important at all 4

Interview ID#_____

80.   How much do you enjoy speaking English?

tremendous enjoyment... 1

quite a bit of enjoyment 2

not too much enjoyment... 3

no enjoyment.. 4

don't speak Spanish 5

81.   How much are American values a part of your life?

very much a part 1

a good part 2

a small part... 3

no part at all 4

82.   How many days a week would you like to eat American food?_____

83.   How proud are you of being American?

very proud 1

fairly proud 2

not too proud.. 3

not proud at all 4

I feel ashamed 5

84.   How comfortable would you be in a group of Americans who don't speak Spanish?

very comfortable 1

fairly comfortable... 2

not too comfortable 3

not comfortable at all 4

85.   How important is it to you to raise your children with American values?

very important... 1

fairly important 2

not too important.. 3

not important at all 4

86.   How much do you enjoy American TV programs?

very much 1

quite a bit 2

not too much 3

not at all 4

Interview ID#_____

87.   How important is it to you to celebrate holidays in the American way?
very important...1
fairly important 2
not too important...3
not important at all 4

88.   With respect to kindness and generosity, do you think Americans are:
very kind and generous 1
fairly kind and generous...2
a little kind and generous 3
not kind and generous at all 4

89.   How important would it be to you for your children to have all American friends?
very important...1
fairly important 2
not too important...3
not important at all 4

Questions regarding your family background and demographical information

The following questions are about your racial and ethnic background and your personal information. Please answer as honestly as possible.

90.   In what country was your father born?
   ○   United States, except Puerto Rico
   ○   Puerto Rico
   ○   Other, please specify. _____
   ○   Refused
   ○   Don't know

91.   In what country was your mother born?
   ○   United States, except Puerto Rico
   ○   Puerto Rico
   ○   Other, please specify. _____
   ○   Refused
   ○   Don't know

Interview ID#_____

92.   In what country was [the participating child's] father born?
 ○ United States, except Puerto Rico
 ○ Puerto Rico
 ○ Other, please specify. _____
 ○ Refused
 ○ Don't know

93.   In what country were you born?
 ○ United States, Except Puerto Rico
 ○ Puerto Rico
 ○ Other, please specify. _____
 ○ Refused
 ○ Don't know

IF PARTICIPANT WAS BORN IN THE UNITED STATES, SKIP TO QUESTION 91.

IF NOT BORN IN THE U.S. CONTINUE WITH QUESTION 90.

94.   How long (*number of years*) have you lived in the U.S.? _____

95.   Have you ever lived outside of the U.S.?
 ○ Yes
 ○ No

IF YES, GO TO QUESTION 92. IF NO, GO TO QUESTION 94.

96.   In what countries have you lived? _____

97.   For how many years? _____

Interview ID#_____

98.   What race do you identify yourself? (check all that apply)
   ○   White
   ○   Black
   ○   American Indian
   ○   Some other race, please specify _____
   ○   Don't identify with any race
   ○   Refused
   ○   Don't know

99.   What ethnicity do you identify yourself?
   ○   Latina
   ○   Hispanic
   ○   Taina
   ○   Some other ethnicity, please specify _____
   ○   Don't identify with any ethnic group
   ○   Refused
   ○   Don't know

100.   How you describe your nationality?
   ○   Puerto Rican
   ○   Other, please, specify _____

101.   What is your month and year of birth? (MM/YYYY) _____/_____

102.   What is your marital status? Are you:
   ○   Married
   ○   Divorced
   ○   Widowed
   ○   Separated
   ○   Single
   ○   Single, Never been married
   ○   A member of an unmarried couple
   ○   Refused

Interview ID#_____

103. What is the highest level of education you have completed?
   o   Less than high school
   o   High school diploma
   o   Some college or associate's degree
   o   Bachelor's degree or higher
   o   Master's degree
   o   Doctoral degree
   o   Other, please specify _____
   o   Refused

104. What is the highest level of education of your spouse/partner or significant other?
   o   Less than high school
   o   High school diploma
   o   Some college or associate's degree
   o   Bachelor's degree or higher
   o   Master's degree
   o   Doctoral degree
   o   Other, please specify _____
   o   Refused

105. Do you work outside the home? If yes, what is your occupation? _____

106. Who is the head of the household? _____

107. What is your annual family income?
   o   Less than $20,000
   o $20,000 – $39,000
   o $40,000 – $59,000
   o $60,000 – $79,000
   o $80,000 or greater
   o   Refused
   o   Don't know

Interview ID#_____

Anthropometric Measurements

We have completed the survey. Now, we will take some measurements.

Maternal Factors	
Weight (*lbs*)	
Height (*inches*)	
Waist circumference (*inches*)	

Child Factors	
Weight (*lbs*)	
Height (*inches*)	
Waist circumference (*inches*)	

Please indicate if measurements were self-reported. _____

Now I am going to ask you a couple of questions to help us determine what type of health programming would be of interest to you.

1. Would you be interested in receiving information or workshops on any of the following? (***Check all that apply***)
   ___Cooking demonstrations
   ___ Nutrition
   ___ Exercise
   ___ Meal shopping
   ___ Meal planning

2. What type of format would you prefer? (***Check all that apply***)
   ___ Formal/written materials
   ___ Group discussions
   ___ Presentations
   ___Private consultations
   ___ Other, please specify _____

PARTICIPANT WILL SIGN PARTICIPATION FORM INDICATING RECEIPT OF GIFT CARD
AND CHILD'S BOOK.
Thank you for your participation!

Again, if you have any questions about this project, you may contact Lisa Aponte-Soto at
lapont2@uic.edu .Once the study is completed, we will host a presentation to share the results with you
and your family.

LIST OF CHILD-FEEDING PRACTICES QUESTIONNAIRE VARIABLES
(Musher-Eizenman & Holub, 2007)

Child Control–Parents allow the child control of his/her eating behaviors and parent-child-feeding interactions.
5.   Do you let your child eat whatever s/he wants?
6.   At dinner, do you let this child choose the foods s/he wants from what is served?
10.   If this child does not like what is being served, do you make something else?
11.   Do you allow this child to eat snacks whenever s/he wants?
12.   Do you allow this child to leave the table when s/he is full, even if your family is not done eating?

Emotion regulation–Parents use food to regulate the child's emotional states.

7.   When this child gets fussy, is giving him/her something to eat or drink the *first* thing you do?
8.   Do you give this child something to eat or drink if s/he is bored even if you think s/he is not hungry?
9.   Do you give this child something to eat or drink if s/he is upset even if you think s/he is not hungry?

Encourage balance and variety–Parents promote well-balanced food intake, including the consumption of varied foods and healthy food choices.
13.   Do you encourage this child to eat healthy foods before unhealthy ones?
24.   I encourage my child to try new foods.
26.   I tell my child that healthy food tastes good.
38.   I encourage my child to eat a variety of foods.

Environment–Parents make healthy foods available in the home.

14.   Most of the food I keep in the house is healthy.
16.   I keep a lot of snack food (potato chips, Doritos, cheese puffs) in my house. **R**
22.   A variety of healthy foods are available to my child at each meal served at home.
37.   I keep a lot of sweets (candy, ice cream, cake, pies, pastries) in my house. **R**

Food as reward–Parents use food as a reward for child behavior.
23.   I offer sweets (candy, ice cream, cake, pastries) to my child as a reward for good behavior.
36.   I withhold sweets/dessert from my child in response to bad behavior.
19.   I offer my child his/her favorite foods in exchange for good behavior.

Involvement–Parents encourage child's involvement in meal planning and preparation.
15.   I involve my child in planning family meals.
20.   I allow my child to help prepare family meals.
32.   I encourage my child to participate in grocery shopping.

Modeling–Parents actively demonstrate healthy eating for the child.
44.   I model healthy eating for my child by eating healthy foods myself.
46.   I try to eat healthy foods in front of my child, even if they are not my favorite.
47.   I try to show enthusiasm about eating healthy foods.
48.   I show my child how much I enjoy eating healthy foods.

Monitoring–Parents keep track of child's intake of less healthy foods.

1. How much do you keep track of the sweets (candy, ice cream, cake, pies, pastries) that your child eats?
2. How much do you keep track of the snack food (potato chips, Doritos, cheese puffs) that your child eats?
3. How much do you keep track of the high-fat foods that your child eats?
4. How much do you keep track of the sugary drinks (soda/pop, kool-aid) this child drinks?

Pressure–Parents pressure the child to consume more food at meals.

17. My child should always eat all of the food on his/her plate.
30. If my child says, "I'm not hungry," I try to get him/her to eat anyway.
39. If my child eats only a small helping, I try to get him/her to eat more.
49. When he/she says he/she is finished eating, I try to get my child to eat one more (two more, etc.) bites of food.

Restriction for Health–Parents control the child's food intake with the purpose of limiting less healthy foods and sweets.

21. If I did not guide or regulate my child's eating, s/he would eat too much of his/her favorite. foods.
28. If I did not guide or regulate my child's eating, he/she would eat too many junk foods.
40. I have to be sure that my child does not eat too much of his/her favorite foods.
43. I have to be sure that my child does not eat too many sweets (candy, ice cream, cake, or pastries).

Restriction for weight control–Parents control the child's food intake with the purpose of decreasing or maintaining the child's weight.

18. I have to be sure that my child does not eat too many high-fat foods.
27. I encourage my child to eat less so he/she won't get fat.
29. I give my child small helpings at meals to control his/her weight.
33. If my child eats more than usual at one meal, I try to restrict his/her eating at the next meal.
34. I restrict the food my child eats that might make him/her fat.
35. There are certain foods my child shouldn't eat because they will make him/her fat.
41. I don't allow my child to eat between meals because I don't want him/her to get fat.
45. I often put my child on a diet to control his/her weight.

Teaching about nutrition–Parents use explicit didactic techniques to encourage the consumption of healthy foods.

25. I discuss with my child why it's important to eat healthy foods.
31. I discuss with my child the nutritional value of foods.
42. I tell my child what to eat and what not to eat without explanation. **R**

Note. Factor names are presented with a brief operational definition of the factor content. Item numbers indicate the order in which they were presented in the survey. Items numbered 1-13 utilize a 5-point response scale "never, rarely, sometimes, mostly, always." Items numbered 14-49 utilize a 5-point scale with different anchors, "disagree, slightly disagree, neutral, slightly agree, agree." Items marked with an R were reverse coded.

APPENDIX F

POSITION FOR COLLECTING HEIGHT (CDC, 2004)

Looking straight ahead

Shoulders relaxed

Arms at sides

Legs straight and knees together

Feet flat – heels almost together; feet pointed outward at 60° angle

90°

Frankfort Horizontal Plane

Shoulder blades, buttocks, and heels touching measurement surface
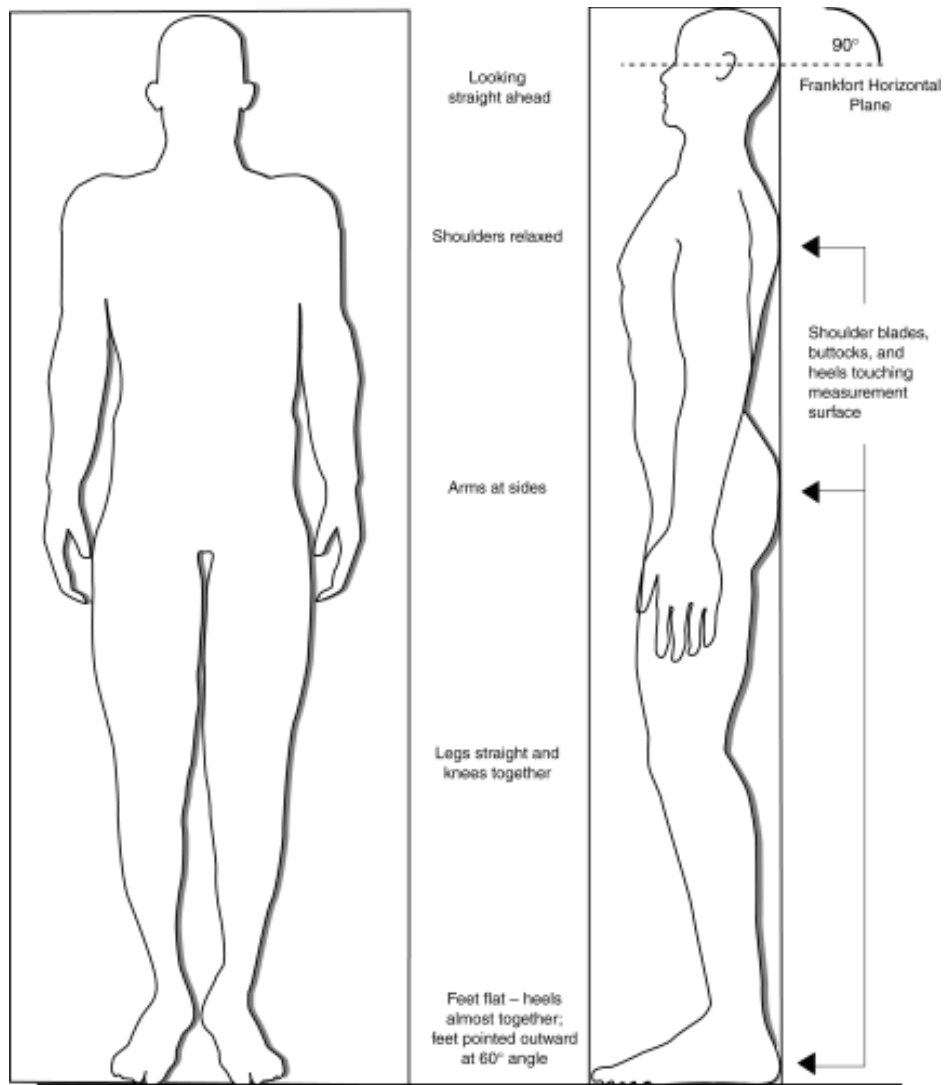
APPENDIX G

MEASURING TAPE POSITION FOR ABDOMINAL (WAIST) CIRCUMFERENCE
(CDC, 2004)
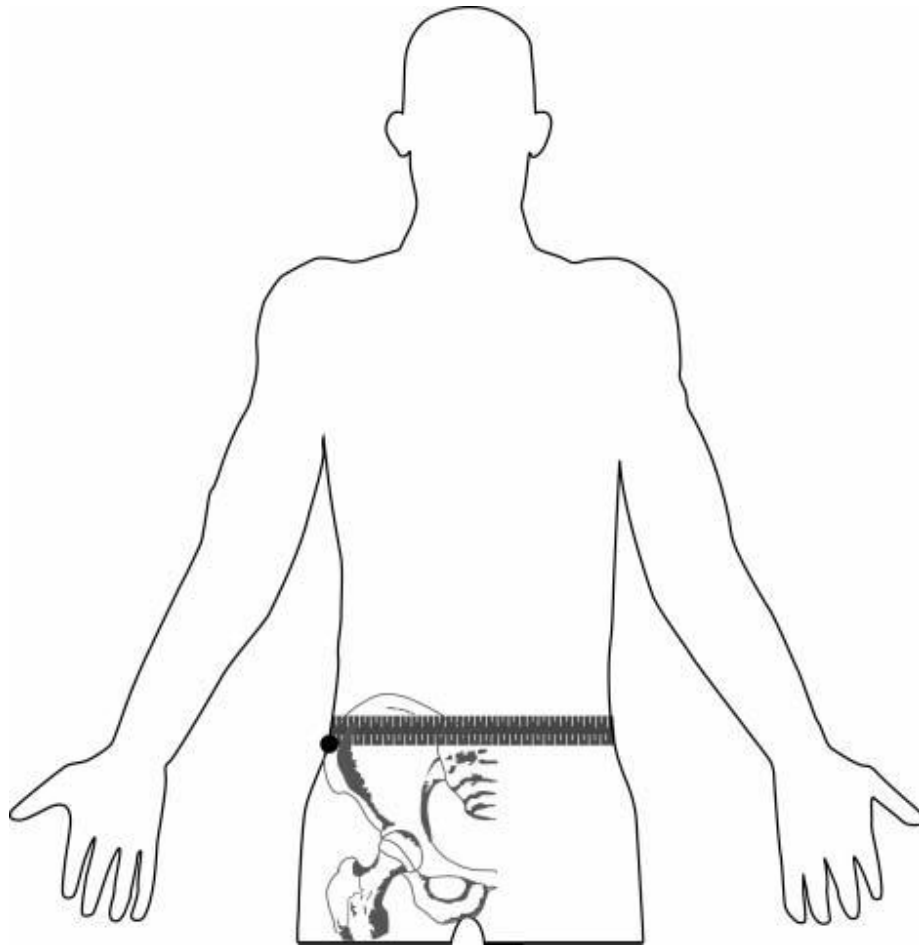
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