

**Childhood Obesity Prevention: Acculturation and Feeding Practices of Low-
Income Latino Families**

by
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Dedication

This dissertation is dedicated to my endlessly supportive husband, Harry, who made it possible, and to my children Lila, Camila, and Harry Jr., who made it all worthwhile.

Without y'all I could have finished years ago.

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Abstract

Background: Latinx children are disproportionately affected by obesity in the United States, with second- and third-generation Latinx children having higher levels of obesity than first-generation immigrants. Parental feeding practices in response to children's hunger and satiety cues have been associated with children's weight status and may offer one possible explanation for these rising obesity rates among Latinx children. **Purpose:** The extent to which parental acculturation relates to feeding practices among low-income Latino families is not well documented. The proposed study examined to what extent maternal acculturation moderated the effects of a seven-week family-based childhood obesity prevention program (Strategies for Effective Eating Development) on parental feeding attitudes and behaviors. **Methods:** Participants (208 low-income Latina mothers and their preschool children) were part of a randomized control trial conducted in a large urban area in the Southern U.S. and a medium-sized town in the rural, Inland Pacific Northwest of the U.S. The study used a validated measure of English acculturation (the Bidimensional Acculturation Scale) and a comprehensive measure of feeding practices (the Food Parenting Inventory). Five separate two-way analysis of covariance (2-way ANCOVA) were implemented to test the moderating effect of English acculturation on the effect of the 7-week childhood obesity prevention program on components of parental feeding attitudes and practices (Family Meals, Structure, New Foods, External Control, and Responsiveness). **Results:** Results indicated that the intervention was effective in increasing mother's feeding attitudes and practices in the area of Responsiveness (to children's internal cues of hunger and fullness), only among mothers reporting higher levels of English acculturation. Conversely, the reduction of the use of

excessive parental pressure/coercion or indifference/lack of involvement while feeding their children (i.e. External Control) only appeared to be effective among mothers endorsing low levels of English acculturation. The intervention was equally effective regarding the secondary goals of increasing exposure and acceptance of New Foods, increasing the Structure and predictability of how meals are prepared and served at home, and increasing the regularity and consistency of mealtimes and parental involvement in determining child's portion size (Family Meals) among mothers reporting both high and low levels of English acculturation. **Conclusion:** These findings provide evidence of successful childhood obesity prevention efforts in four out of five components of examined maternal feeding attitudes and practices. Results highlight the possible shortcoming of the SEEDS prevention program in effectively and equitably targeting mothers reporting lower levels of maternal English acculturation as related to the parental feeding practice of Responsiveness.

Keywords: acculturation, childhood obesity, maternal feeding attitudes and practices

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Chapter 1

Introduction

Obesity continues to be a problem in the United States, with recent data indicating that almost forty percent of adults are obese. The estimated annual medical cost for obesity in the United States was \$147 billion in 2008, and obesity is associated with serious health risks and some of the leading causes of preventable, premature death, (CDC, 2018). Latinx adults have shown the highest prevalence of obesity (47.0%), almost ten percent higher than the prevalence of obesity among non-Hispanic white adults (37.9%) (Hales, Carroll, Fryar, & Ogden, 2017). Unfortunately, the rise in obesity rates has also been reported among American children, with prevalence rates reaching almost 20 percent, and Latino children being disproportionately affected (25.8%) (CDC, 2018). With rapid growth patterns reported in recent years, the Latino population is projected to represent more than one-quarter (29%) of the total U.S. population by 2060 (U.S. Census Bureau, 2014). This population explosion has led to a greater awareness of culturally based health disparities, with growing obesity rates being among the most concerning.

The immigrant paradox refers to a decline in initially positive health and psychological outcomes of first-generation immigrants in the U.S. (Horevitz & Organista, 2012). In time and through generations, Latino immigrants appear to lose an initial protective factor associated with recent immigration and display higher rates of health concerns, including childhood obesity. Past research has indicated that second- and third-generation Latinx children have higher levels of obesity than first-generation immigrants (Hernandez-Valero et al., 2007; McCullough & Marks, 2014; Popkin & Udry, 1998; Van Hook et al.,

2012). This has led researchers to ask if adaptation to US culture and lifestyles increases the risk of childhood obesity, and investigate the role of acculturation in obesity risk.

Acculturation is complex and difficult to capture, but generally refers to the degree to which immigrants and their descendants adopt aspects of the dominant U.S. culture in the domains of behavior, cultural identification, knowledge, beliefs, attitudes, language, and values (Berry, 2006; Torres & Rollock, 2007). Some studies of Latinx children indicate a positive relationship between child or maternal acculturation and child weight status, and other studies have reported a negative relationship (Bacardi-gascon, Heyman, 2012; Elder et al., 2010; Fuentes-Afflick & Hessol, 2008; Gordon-Larsen, Harris, Ward, & Popkin, 2003; Wojcicki, Schwartz, Jimenez-cruz). These inconsistent findings may reflect differences in the theoretical conceptualization of the cultural adaptation process (i.e. unilinear vs. bidimensional model) and the operationalization of acculturation (i.e. use of proxy measures) across studies. Further research is needed to clarify the relationship between acculturation and factors associated with childhood obesity.

Parental feeding practices in response to children's hunger and satiety cues have been associated with children's weight status (Birch & Fisher, 1998; Johnson & Birch, 1994). Studies with white, middle-class families suggest that highly controlling feeding practices may contribute to children's obesity. In contrast, studies with low-income, Hispanic families indicate that highly permissive and indulgent feeding patterns are positively related to childhood obesity (Birch & Fisher, 1998; Faith, Scanlon, et al., 2004; Fisher & Birch, 1999; Hoerr, Hughes, Fisher, Nicklas, Liu, & Shewchuk, 2009; Johnson & Birch, 1994; Olvera & Power, 2010; Tovar et al., 2012). These studies suggest that the relation of parental feeding practices to children's weight status may vary across cultures.

Despite the disproportionate prevalence and growth rates of obesity in Latinx children, most research regarding parental feeding practices has been conducted with white families (Burdette et al., 2006; Faith, Scanlon, Birch, Francis, Sherry, 2004). Therefore, very little is known regarding the relation of acculturation to Latinx parental feeding practices. To address this gap in the literature, the proposed study will examine the relation between parental acculturation and feeding practices among low-income Latina mothers with preschool children, using a validated measure of English acculturation and a comprehensive measure of feeding practices. The proposed study seeks to expand on previous research by also examining the possible interaction of parent acculturation on the effects of a 7-week family-based childhood obesity prevention program (Strategies for Effective Eating Development) on parental feeding attitudes and behaviors. Knowledge about sociocultural processes that may be associated to childhood obesity among low-income Latino families may contribute to the development and refinement of culturally appropriate treatment and prevention efforts.

Chapter two will guide the reader through a review of relevant literature related to the key variables in this study. The first section will focus on a brief overview of the development of cultural adaptation theory (e.g. acculturation vs. enculturation), followed by a review of literature linking child weight status to parental acculturation. The remaining sections of chapter two introduce the reader to the overall study of parental feeding attitudes and practices, and then detail key findings related to the five overarching dimensions of parental feeding attitudes and practices measured in the current study (i.e. responsiveness, external control, new foods, family meals, and structure). Chapter 3 will present findings, discussion, and limitations related to the present study.

Chapter 2

Literature Review

Cultural Adaptation Theory

Early attempts to operationalize acculturation led to the development of a linear model of acculturation-assimilation (Gordon, 1964). This model conceptualizes acculturation as a process of unidirectional change in which individuals gradually lose orientation towards their culture of origin as they begin to gain a preferential orientation towards their new host culture. In this linear model, the unacculturated individual represents the starting point, with gradual movement towards the opposite pole representing acculturation towards mainstream American culture. The progressive adoption of mainstream values and beliefs eventually results in the disappearance of the ethnic group as a separate entity and the assimilation of the immigrant group to the host culture (Gordon, 1964).

The more recent bidimensional model reflects the potential for the simultaneous maintenance of Latino and mainstream American cultural orientations in the acculturation process (Berry & Sam, 1996). The most fundamental departure from the previous linear model was the conceptualization of two independent orientations of acculturation: maintenance of culture of origin (*enculturation*) and adaptation to the host culture (*acculturation*). Enculturation refers to cultural continuity, or the maintenance of one's cultural heritage (Berry, 2006). Acculturation is adaptation to the host culture, which represents the individual's participation with mainstream culture and the adoption of the values, beliefs, and behaviors of the nonheritage culture.

Consistent with the bidimensional model, researchers have developed separate scales to assess each of the two cultural orientations. Research has supported a bidimensional

approach over a linear approach to cultural adaptation (Yoon et al., 2013). Due to very limited sample variability with regards to measurement of enculturation, the proposed study will focus solely on the measurement of maternal acculturation and its relationship to measures of parental feeding practices and attitudes.

Parent Acculturation as Related to Child Weight Status

Latino children have the highest rates of obesity of all racial/ethnic groups (CDC, 2018). Studies of Latino adults' body mass have supported the immigrant paradox phenomenon, with higher levels of acculturation being associated with an elevated risk of obesity (as cited in Fuentes-Afflick & Hessol, 2008). However, there is a lack of consensus about the relation between acculturation and body mass among Latino children. Studies have indicated that second- and third generation Latinx children have higher levels of obesity than first-generation immigrants (Hernandez-Valero et al., 2007; McCullough & Marks, 2014; Popkin & Udry, 1998; Van Hook et al., 2012). However, research examining the role of acculturation on child obesity has reported mixed results. Some studies indicate a positive relationship between maternal English acculturation and Latinx children's weight status, and others have reported a negative relationship (Bacardi-Gascon, Heyman, 2012; Elder et al., 2010; Fuentes-Afflick & Hessol, 2008; Gordon-Larsen, Harris, Ward, & Popkin, 2003; Wojcicki, Schwartz, Jimenez-Cruz,).

Among Latina mothers living in the US, both longitudinal (Fuentes-Afflick & Hessol, 2008) and cross-sectional studies (Hernandez-Valero et al., 2007) indicated that children of US-born mothers are at higher risk of being overweight than children of foreign-born mothers. However, regardless of place of birth, mothers' English acculturation was not related to their children's weight status (Ariza, Chen, Binns, & Christoffel, 2004; Fuentes-

Afflick et al., 2008; Hernandez-Valero et al., 2007). In contrast, studies examining the relation of parental Spanish enculturation to children's weight status for the most part have reported that among Latinx families in the U.S., higher Spanish enculturation was associated to increased risk for children's overweight status (Elder et al, 2010; Sussner et al., 2009; Wojcicki et al., 2012).

The current study seeks to bridge the informational gap linking mother's immigrant status and/or English acculturation to greater risk of overweight in young children. One possible explanation is that parental feeding attitudes and practices related to parental acculturation may provide a part of the missing link. Therefore, the purpose of the current study is to examine to what extent maternal acculturation moderates the effectiveness of a childhood obesity prevention program in improving the mothers' feeding attitudes and practices.

Parental Feeding Attitudes and Practices

Parents play a pivotal role in setting the stage for the development of children's eating experiences in early childhood (Birch & Fisher, 1998). Parents can shape almost every aspect of their children's eating environment including the quantity, timing, selection, location, and emotional climate of mealtimes. In the 1990's, research interest examining the role of parental feeding practices in the development of children's eating behaviors and weight status began to grow, with a subsequent boom occurring in the early 2000's following the rising rates of childhood obesity in the US (Power, Johnson, Beck, Diaz Martinez, & Hughes, 2019). Previous findings have supported the role of parenting practices in influencing not only children's food preferences, but also their proneness to obesity (Birch, Marlin Kramer, & Peyer, 1981; Birch & Fisher, 1998; Johnson & Birch, 1994; Faith, Scanlon, et al., 2004;

Fisher & Birch, 1999). A very early study (Birch et al., 1981) of socioeconomically diverse mother-child dyads found that mothers of more overweight children tended to talk less to their children during mealtime settings and were less responsive to their children's behavior. Additionally, Birch et al. (1981) found that thinner children and their mothers ate less food at a slower rate, talked more about food and nonfood topics, and made more positive comments about the food.

Very few studies have examined the association of acculturation to parental feeding practices (Evans et al., 2011; Kaiser, Melgar-Quiñones, Lamp, Johns, & Harwood, 2001; Power, O'Connor, Fisher, & Hughes, 2015; Seth et al., 2007). The proposed study will examine Latina mothers' acculturation and its relationship to their children's feeding practices along five primary dimensions: Responsiveness, External Control, New Foods, Family Meals, and Structure. The proposed study will also examine to what extent acculturation moderates the effectiveness of the SEEDS prevention program (Hughes et al., 2016), which was designed to foster healthy feeding practices across these five dimensions.

Responsiveness

Responsiveness refers to parents' recognition and appropriate response to young children's cues of hunger and satiety (Hodges et al., 2015). Infants appear to be born with a nascent capacity for self-regulation that can be supported through consistent and appropriate cause and effect interactions with parents (DiSantis, Hodges, Johnson, & Fisher, 2011). Parents can promote children's capacity for self-regulation by acknowledging, (i.e. "How is your stomach feeling? Is it full or empty?"), and accepting (i.e. encouraging eating when hungry & stopping before becoming too full) children's hunger and fullness cues (Ryan & Deci, 2000).

A 2011 systematic review provided evidence that infants and toddlers are able to self-regulate energy intake across meals/feedings by adjusting food intake in response to changes in feeding frequency and energy content of foods. For instance, in early studies, Birch and Deysher (1985 & 1986) found that after consuming either high or low-calorie density preloads (indistinguishable to participants), during the subsequent meals young children were significantly better at intake regulation than adults. A later study following children's diet for 24 hours over 6 days showed that while children's energy intake varied quite a bit from meal to meal, children's daily intake varied little because they adjusted their energy intake during successive meals (Birch, Johnson, Andresen, Peters, & Schulte, 1991).

Beginning around 3 years of age, however, children increasingly turn to parents for feeding cues (Hughes, Power, Fisher, Mueller, & Nicklas, 2005). A 2006 study of Hispanic and Non-Hispanic white children again showed that young children were able to adjust their consumption at a meal after consuming a high or low calorie preload, but that this ability to self-regulate declined with increasing age (Johnson & Taylor-Holloway, 2006). A twin study utilizing a similar variable calorie preload followed by a meal, showed that compensation was significantly poorer among girls, and Hispanic and African American twins (Faith et al., 2012) and that self-regulation was also linked to weight status. Furthermore, more than 20 percent of the variance in compensation scores was due to "shared environmental 'household' factors" rather than genetic, random, or child-specific factors, emphasizing the influence that parents' behaviors have in the development of their children's eating patterns.

The overarching goal of the SEEDS prevention program (Hughes et al., 2016) was to teach parents and children to learn to recognize and respond to children's internal cues of hunger and fullness. During mealtimes, mothers were encouraged to promote the continued

development of self-regulation by attending to their children's internal fullness and hunger cues, rather than utilizing excessive pressure and external control that may override optimal energy intake (Birch & Fisher, 1998). Research related to responsiveness as a feeding strategy among Latina mothers is very scarce. Therefore, one of the goals of the SEEDS intervention was to increase Latina mothers feeding responsive attitudes and behaviors.

External Control

When parents impose goals, motivations, or even threats and demands related to children's feeding, they are enforcing external control. Until recently, the use of external control was thought to hinder children's eating self-regulation, but more recent studies with low-income, ethnically diverse samples have not supported the association of restrictive and controlling feeding attitudes and behaviors to childhood obesity (Hoerr, Hughes, Fisher, Nicklas, Liu, & Shewchuk, 2009). This section will first guide the reader through early research findings among mostly white, middle –class families related to external control in the feeding context, and then review findings from studies with ethnically diverse samples.

Early findings among homogenous samples. Dr. Birch pioneered studies of the development of children's eating behaviors. In an early study focused on the influence of social-affective context on preschooler's food preferences, presenting foods as a reward, or noncontingently with adult attention increased preschoolers' preference for the previously neutral food (Birch, Zimmerman, & Hind, 1980). Visibly restricting access to a target snack food resulted in increased desire (i.e. comments and behaviors directed at the restricted food) and increased intake of that target food when it became available (Fisher & Birch, 1999). These effects of restricting practices were particularly salient for children with mothers who reported restricting access to the target snack-food at home. Mothers of children with higher

weight status were also more likely to report greater levels of restriction at home (Fisher & Birch, 1999).

In a 1994 study of the effects of mothers' control over their child's food intake, Johnson and Birch reported that parental control was the most significant predictor of children's ability to regulate their energy intake, and that mothers who reported being more controlling of their child's food intake (e.g. encouraging their child to finish their food, or encouraging their child to eat only at mealtimes rather than in response to hunger) had children who showed less ability to self-regulate their caloric intake. Similarly, Faith et al.'s (2004) literature review of the associations between parental feeding behaviors and child eating and weight status indicated that most studies specifically assessing maternal feeding restriction found significant associations with increased child eating and weight status. These early studies among mostly white, middle-class families highlight the impact of the social-emotional context of food interactions in shaping preschoolers' food consumption, and the possible unintended consequences of food restriction including a constrained ability to self-regulate consumption and higher weight status.

Previous research has also shown that parental feeding practices can have an impact on preschoolers' food preferences. For example, Powell et al. (2011) found that maternal feeding practices significantly predicted children's food avoidance eating behaviors even after controlling for child emotionality and maternal dietary restraint. More specifically, Powell et al. (2011) found that maternal reports of child food avoidance were associated with several maternal feeding practices and attitudes including (1) use of control (including pressure to eat more and restriction of less healthy foods)(2) use of food for behavior regulation (3) low encouragement of balanced and varied foods and (4) less healthy food-

related home environment. Furthermore, maternal reports of pressuring their child to eat more at meals were predictive of child food avoidance behaviors, including pickiness. The authors suggest that there may be a cyclical, additive parent-child relationship wherein picky and food-avoidant behavior in children is likely to result in parents' use of pressure to eat more, which then exacerbates children's food avoidance (Powell et al., 2011). Similarly, mother's self-reported restriction of their child's less-healthy foods and sweets intake for health purposes was predictive of child food fussiness (i.e. picky eating). This early research has suggested that high levels of controlling parental feeding practices are associated with children's increased preference for restricted foods (Fisher & Birch, 1999), and lower fruit and vegetable intake over time (Galloway, Fiorito, Lee, & Birch, 2005). It is possible that parents' attempts to restrict preferred foods in an attempt to promote more healthy varied food choices may have the opposite effect among more affluent children.

Findings among minority samples. Taken together, in studies with white, middle – class families, parents' use of restrictive and controlling feeding practices are positively associated to children's low eating self-control behaviors and overweight status. Studies with low-income, ethnically diverse samples, however, do not support this association of restrictive and controlling feeding attitudes and behaviors to childhood obesity. For example, in a study of 715 low-income preschool children, researchers found that feeding styles consistent with *low demand* (indulgent and uninvolved) were related to more energy-dense diets (Hoerr et al., 2009). The children of parents who exhibited higher demandingness during mealtime interactions (i.e. gave more directives) demonstrated improved food intake of nutrient-rich foods. A study with recently immigrated Latina mother-child dyads indicated that low demandingness was associated with a greater risk of childhood obesity (Tovar et al.,

2012).

In sum, research findings suggest that parental demandingness in the form of encouragement might have a positive effect on the dietary intake of ethnically diverse, low-income children (Hoerr et al., 2009; Tovar et al., 2012). These research findings had important implications for the development of the SEEDS curriculum (Hughes et al., 2016). As previously noted, the overarching goal of the SEEDS program was to teach mothers and children to learn to recognize and respond to children's internal cues of hunger and fullness. Mothers were discouraged from utilizing excessive pressure/coercion (or on the other end of the spectrum, becoming uninvolved) when feeding their children. Mothers were also instructed to promote self-regulation by attending to their child's cues and encouraging a varied diet through the exploration of new foods (Hughes et al., 2016).

Findings related to acculturation. A few studies have examined the association of acculturation to Latinx parents use or endorsement of control-based feeding practices with their children. Furthermore, the few studies that have examined the prevalence and role of Latinx parental feeding practices as a function of acculturation have been hindered by limited assessment of acculturation and feeding practices, and have produced inconsistent results. (Evans et al., 2011; Kaiser, Melgar-Quinonez, Lamp, Johns, & Harwood, 2001; Power, O'Connor, Fisher, & Hughes, 2015; Seth et al., 2007).

In a 2001 study, Kaiser and colleagues conducted a cross-sectional survey of 238 low-income Mexican American families with preschool children in California. Results indicated that *higher* English maternal acculturation was associated with lower acceptance of controlling strategies such as threats, bribes, and punishments as effective feeding strategies. While prevalence of overweight was high among both more and less acculturated

preschoolers, triceps skinfold thickness was generally larger in children of more acculturated mothers. Results of low acceptance of control strategies along with larger child skinfold thickness could indicate the existence of a more passive or low demand approach to child feeding among more acculturated families that has been associated with a greater risk of childhood obesity among low-income Latino families (Hoerr et al., 2009; Tovar et al., 2012)

Other studies have found that compared to their more acculturated counterparts, less English acculturated parents were more likely to worry about their child's weight and overeating, push/pressure or incentivize their children to eat (i.e. higher demand), use food as a reward or to calm children, restrict children's eating for health purposes, and exhibit an overall more demanding feeding style (Evans et al., 2011; Power et al., 2015; Seth et al., 2007)

Thus, the most consistent findings suggest that less acculturated parents place more pressure on their preschool children to eat (which, unlike among white middle-class families, may be protective for childhood obesity among low-income, minority families), and are more likely to use food for non-nutritive purposes (Power et al., 2015). These findings generally support the pattern of Latino childhood obesity presented earlier by Hughes and colleagues (2016) that has linked child weight status to low-parental demand during mealtimes, particularly among more acculturated parents.

New Foods

A secondary goal of the SEEDS prevention program (Hughes et al., 2016) was to encourage parents to help their children explore and try novel foods such as fruit and vegetables. Many studies have found that repeated parental exposure to foods and social modeling of consuming new foods fosters children's increased liking and higher

consumption of exposed foods (Birch & Marlin, 1982; Birch, McPhee, Shoba, Pirok & Steinberg, 1987; Cooke, 2007; Skinner, Carruth, Bounds, & Ziegler, 2002; Ventura & Birch, 2008; Wardle, Herrera, Cooke, & Gibson, 2003). As Cooke (2007) writes, “Put simply, children like what they know and they eat what they like.” Throughout the 7-week SEEDS prevention program (Hughes et al., 2016), children were repeatedly exposed to novel foods, and encouraged to explore these foods with their senses. Mothers were taught that it is through exploration and repeated exposure that children come to accept new foods as palatable.

Previous research with primarily white, but socially diverse families has provided sound evidence of the benefits of food exposure and social modeling. For example, a cross-sectional self-report study of preschool children and their mothers (Powell, Farrow, & Meyer, 2011) reported that promotion of a balanced and varied child food intake predicted reports of lower food fussiness (i.e. picky eating), and that providing a healthy food-related home environment was associated with lower food avoidance behaviors in children. Similarly, a longitudinal study of children in the first two years of life found that frequent exposure to a wide variety of fruits predicted the variety of fruits consumed years later (Skinner et al., 2002).

A 2006 study focusing on Mexican-American 5th graders found that among food-secure families, mother’s endorsement of making healthful foods available was positively associated with children’s fruit consumption, and negatively associated with children’s percentage intake from fat. These correlations differed significantly compared to food-insecure families, wherein mother’s endorsement of making healthful foods available was negatively associated with children’s energy intake and BMI. The authors suggest that level

of food security may mediate the associations between food-related parenting attitudes and children's food intake (Matheson, Robinson, Varady, & Killen, 2006).

Exposure increases acceptance, and the inverse has also been supported in literature, with evidence that parents who do not expose or limit the exposure of their young children to an array of foods are more likely to report higher levels of child food avoidance behaviors (Birch, 1999; Carruth et al., 2004). For example, in their 2001 study of low-income Mexican-American families, Kaiser and colleagues indicated that *lower* English maternal acculturation was associated with offering more alternative foods in response to food refusal. The authors suggest that less acculturated parents may be undermining traditional healthy diets (i.e. beans, corn tortillas, or dishes containing vegetables) in favor of more Americanized and generally less nutritious foods by allowing children to opt out of trying these traditional foods (Kaiser et al., 2001)

Strong evidence exists for the importance of repeated exposures to a wide variety of foods in promoting a more successful, enjoyable parent-child feeding environment and preventing feeding problems. Familiarity alone accounts for more than half the variance in children's food preferences, and exposure-based interventions have been successful in improving diet quality among diverse socioeconomic samples. This is particularly important for low socioeconomic status (SES) children, whose fruit and vegetable consumption may be lower than their higher SES counterparts (Cooke, 2007). Therefore, the SEEDS prevention program aimed to increase parents' accepting attitudes and increased behaviors regarding children's exposure to new foods, as well as encouraging persistence in providing exposures as children's acceptance of novel foods may require 8-12 exposures (Hughes et al., 2016).

Family Meals

Family routines provide structure, predictability, and help support the early development of social, emotional, and language development (Eisenberg, Olson, Nuemark-Sztainer, Story, & Bearinger, 2004; Fiese, Foley, & Spagnola, 2006; Fulkerson et al., 2006; Fulkerson et al., 2009; Spagnola & Fiese, 2007) Family mealtimes can provide a valuable opportunity for children to grow and connect in a meaningful way.

Furthermore, frequency of family mealtimes have been linked to children's weight status (Anderson & Whitaker, 2010; Fulkerson et al., 2009; Taveras et al., 2005). A 2010 cross-sectional study found that children who regularly ate dinner with their family, slept adequately, and had limited screen time, demonstrated a 40% lower prevalence of obesity than their peers after controlling for maternal obesity and SES (Anderson & Whitaker, 2010). Various studies have reported that more frequent family meals were correlated with a more nutritious diet including higher intake of fiber, more vitamins and minerals, and increased fruit and vegetable consumption (Fulkerson et al., 2009; Fulkerson et al., 2006; Gillman, 2000; Videon & Manning, 2003). The frequency of family meals has also been inversely related to consumption of soft drinks and high-fat foods (Gillman, 2000).

At the same time, high-risk adolescents who reported no family dinners were almost three times more likely to be overweight, and six times more likely to be food insecure than adolescents who reported five to seven family dinners in the previous week (Fulkerson et al., 2009). These findings suggest that family meal frequency is overall beneficial for children and adolescents' physical and emotional well-being. Therefore, one of goals of the SEEDS prevention program was to increase parents' accepting attitudes and behaviors geared to increase the structure and frequency of family meals

Structure

Structure refers to an array of parent-led feeding practices that provide predictability in how meals are prepared and served in the home. As in other aspects of parenting, the importance of routines that provide room for both structure and flexibility help children navigate their environment more easily. In the current study, structured feeding practices include child involvement during mealtime, portion-sizing, and parental monitoring of children's food intake.

Parents typically select their young children's dietary servings, and they may unknowingly contribute to their children's overconsumption. A study of low-income Hispanic and African American families of preschool-aged children revealed that the amount of food parents served themselves was significantly related to the amount they served their children. Furthermore, the more children were served, the more they tended to eat (Johnson et al., 2014). So while previous research has shown that children have the innate capacity to self-regulate their energy intake, there is also evidence that this ability can be significantly influenced by external factors like portion sizing.

Similarly, consuming large portions of energy-dense food has been related to obesity, and one study found that young children consumed 34% more energy during a meal when served a larger, more energy dense entrée. (Fisher, Liu, Birch, & Rolls, 2007). In a sample of low-income Hispanic and African American children, researchers found that doubling portion sizes of entrees and snacks served during a 24 hour period increased children's total energy consumption by 12% (Fisher, Arreola, Birch, & Rolls, 2007). Thus, by consistently serving large portions, parents may be implicitly teaching their children to consume large food portions (Johnson et al., 2014).

Conversely, parents who prepare more home-cooked meals, and allow their children to participate in food preparation may be setting the stage for a healthy food climate in the home. Chu et al. (2013), found that the frequency of food preparation in home was associated with higher fruit and vegetable preferences, as well as higher self-efficacy for selecting and eating healthy foods. Furthermore, diverse studies have reported the benefits of children's involvement in food/meal preparation (e.g. setting the table and helping to prepare foods) including greater nutritional awareness, healthier intake including more fruit and vegetable consumption, cooking and eating enjoyment, less picky eating, and higher self-efficacy for selecting and eating healthy foods (Anliker, Laus, Samonds, & Beal, 1992; Berge, MacLehose, Larson, Laska, & Neumark-Sztainer, 2016; van der Horst, 2012; Chu et al., 2013; van der Horst et al., 2014).

Lastly, the importance of modeling and monitoring a wide variety of meal and snack choices for children can be a key factor in building healthy food habits. Particularly among young children, researchers have found a strong positive correlation between child and parent's diets (Papas, Hurley, Quigg, Oberlander, & Black, 2009). A study of low-income mother-child dyads has highlighted the influence of parental diet on preschool children (Wroten, O'Neil, Stuff, Liu, & Nicklas, 2012). Wroten et al. found that consumption of snacks and sweets, as well as fruit and vegetables, are highly correlated in mother-child dyads, and low-income families were consuming a diet high in snacks and sweets and low in fruits and vegetables. Snacks and sweets in particular can be a source of low-nutrient, energy-dense calories, and snacking is on the rise. A national survey of children's food intake has shown large increases in snacking, with family reports trending towards three snacks per day, and almost 30% of daily calorie consumption (Piernas & Popkin, 2010). These increases

in snacking trends occurred alongside the national rise of childhood obesity in the U.S., and provide a potential intervention in the efforts to prevent future generations of childhood obesity. The SEEDS prevention program included secondary goals of providing families with psychoeducation on appropriate portion sizing for preschool children, healthier food options both at home and on-the-go, and the benefits of structured meal and snack routines (Hughes et al., 2016).

Chapter 3

Present Study

The present study examined the relationships of English acculturation to parental feeding attitudes and practices. The research aim is to test the moderating effect of English acculturation on the effects of a 7-week childhood obesity prevention program supporting child eating self-regulation.

Research Questions and Hypotheses

- 1) Are child sex, maternal immigrant status, maternal English acculturation, and/or maternal education associated with parental feeding practices and attitudes (Responsiveness, External Control, New Foods, Family Meals, and Structure) at pre-test among low-income, Latina mothers?
 - a. Hypothesis:
 - i. Maternal immigrant status will be significantly associated with External Control, such that immigrant mothers will be more likely to endorse higher levels of external control while feeding their child at pretest.

- ii. No hypotheses are proposed about the relation of child sex or maternal education to any of the five parental feeding practices and attitudes (External Control, New Foods, Structure, Family Meals, and Responsiveness) due to the exploratory nature of these analyses.
- 2) Does maternal English acculturation moderate the effects of the intervention on parental feeding attitudes and practices at posttest?
- a. Hypothesis: Due to the exploratory nature of this analysis, no hypothesis is made about the moderation effect of English acculturation on parental feeding attitudes and practices. If English acculturation moderates the effects of the intervention on any of the five dimensions of parental feeding attitudes and practices (i.e. Responsiveness, External Control, New Foods, Family Meals, and Structure), there will be a statistically significant interaction effect of condition (treatment vs. control) by mothers' acculturation (high vs. low English acculturation) on the parental feeding attitude/practice after controlling for pretest score on the same dimension.
 - b. If a moderation effect is found in omnibus testing, post hoc testing will be conducted to examine adjusted group means for significance. No specific hypotheses for post hoc testing are made. This exploratory study examines if among primarily Spanish speaking, low-income, Latina mothers, level of English acculturation moderates the effects of the 7-week childhood obesity prevention program on parental feeding attitudes and practices.

Methods

Participants

This study used archival data collected as part of a randomized control trial by researchers at Baylor University College of Medicine and Washington State University. This study data was collection was conducted in two settings: a large urban area in the Southern U.S. and a medium-sized town in the rural, inland Pacific Northwest of the U.S. Participants in both locations were recruited from Head Start and similar early child development programs serving low-income families. Only Latina mothers and their preschoolers were recruited for the original study. Participants were randomly assigned to either a 7-week childhood obesity psychoeducational prevention or to a no-treatment control group. Six parent-child dyads were excluded from the current study due to significant incomplete data. Therefore, the sample for the current study included 208 mother-child dyads who completed both pre and post assessments.

Measures

Demographics. Participants were asked to provide information including birth dates (mother and child), ethnicity (mother and child), place of birth (mother and child), child sex, maternal education, maternal marital status, and maternal work status.

Acculturation. English Acculturation was measured using the Bidimensional Acculturation Scale (BAS; Marin & Gamba, 1996). The BAS consists of three subscales: overall language use (n=16; e.g., “How often do you speak English?”), language proficiency (n=12; e.g., “How well do you read in English?”), and electronic media language with six items (e.g., “How often do you watch television programs in English?”). The BAS uses a 4-point likert scale response system for the overall language use and electronic media language

(almost never, sometimes, often, almost always) items, and for the language proficiency items (very poorly, poorly, well, and very well). The three subscales are combined to create a Spanish domain and an English domain score. Because there is little variability in the Spanish domain score (about 98% of participants completed questionnaires in Spanish), only scores in the English domain acculturation will be used in the proposed study. A median split cutoff score of 2.5 was used to indicate low or high level of adherence to the cultural domain. The internal consistency of the English domain scores was reported as .96 in the original scale development study, and .84 in the present study (Marin & Gamba, 1996).

Parental feeding attitudes and practices. The Food Parenting Inventory (FPI; Power, Johnson, Beck, Diaz Martinez, & Hughes, 2019) was used to measure parental feeding attitudes and practices. This 53-item questionnaire with 16 subscales uses a 5-point likert scale response system (Disagree, Disagree a little, Neutral, Agree a little, Agree). The FPI is a newly validated measure that contains items from a variety of well-validated feeding questionnaires (Birch et al., 2001; Anderson, Hughes, Fisher, and Nicklas, 2005; Karr, Shapiro, Fell, & Johnson, 2016; Fiese & Kline, 1993), as well as items written specifically for the larger childhood obesity prevention study. A sample item from the FPI reads, “If my child says ‘I’m not hungry,’ I try to get him/her to eat anyway.”

For the purposes of this study, parental feeding attitudes and practices was measured along five primary components extracted through exploratory principal component analyses of participants’ item scores at pre- and posttest, respectively: Responsiveness (Cronbach’s alpha= 0.77-0.83), External Control (Cronbach’s alpha= 0.65-0.70), New Foods (Cronbach’s alpha= 0.78-0.83), Family Meals (Cronbach’s alpha =0.81-0.82), and Structure (Cronbach’s alpha =0.79-0.85).

The Responsiveness component is comprised of two items assessing parental responsiveness to fullness cues (“During mealtime I ask my child if his/her stomach is full,” and “During meals, I ask my child if he/she still is hungry). Higher scores indicate greater parental attention to children’s fullness cues. The external control component is comprised of 11 items assessing parental indifference in child feeding attitudes, pressuring children to eat, and using food as a reward (sample item: If my child says “I’m not hungry,” I try to get him/her to eat anyway). Higher scores indicate greater parental pressure to eat, greater use of food as a reward, and lower endorsement of parental indifference in child feeding attitudes, which is generally not associated with healthier eating practices. The New Foods component is comprised of 10 items that assess parents’ encouragement of exploration/tasting, and repeated presentation of new foods for their children (sample item: If my child refuses to eat a new food, or a food he/she does not like, I continue to offer that food). Higher scores indicate greater parental endorsement of urging, parental encouragement of exploration, and repeated presentation of new foods. The Family Meals component is comprised of 14 items that assess family and parental behavior around mealtimes including regularity and consistency of mealtimes and parental involvement in determining child’s portion size (sample item: We have routine times for meals at our house). Higher scores in this subscale indicate greater adherence to routine, timing, and parental involvement in serving child food portions, which is associated with healthier eating practices. Finally, the Structure component is comprised of 9 items that assess child involvement in food preparation, measurement of food portions, and parental monitoring of child sweets, snacks, and high fat food consumption (sample item: My child helps prepare part of the meal). Higher scores in this

subscale indicate greater endorsement of child involvement, measurement-based portion sizing, and parental monitoring of child's sweets, snacks, and high fat food consumption.

Procedures

This study made use of archival data and was approved by the University of Houston's institutional review board. The original study was conducted in 2 locations – Houston, TX and Pasco, WA. Prevention and control arms were included in each location. Twenty families were recruited for each wave with the goal of randomly assigning 8 to 10 families to each condition (prevention and control). A total of 14 waves were conducted between 2014 and 2016 (6 waves in Houston, TX and 8 waves in Pasco, WA). A total of 255 Hispanic parent/child dyads (136 prevention; 119 control) participated in the original study at pre-test.

Before the psychoeducation prevention trial began and one to three weeks following the completion of the trial, mothers in both the treatment and control groups completed a series of questionnaires including the measures described above. Questionnaires were developed in English and translated into Spanish by a team of translators from diverse Spanish-speaking populations. Mothers were offered questionnaires in either English or Spanish. Approximately 98% of mothers chose to complete the questionnaires in Spanish. Research assistants were available to answer mother's questions and assist those participants with low literacy skills. The retention rate was 84% at posttest (n = 214).

Research Design and Analysis

The main analysis made use of a between-groups factorial design. Five separate two-way analysis of covariance (2-way ANCOVA) were used to test the moderating effect of English acculturation on the effect of a 7-week childhood obesity prevention program on the

five components of parental feeding attitudes and practices (Family Meals, Structure, New Foods, External Control, and Responsiveness). Independent variables included condition (experiment vs. control group), English acculturation (high vs. low), and the interaction term condition by enculturation. The dependent variables included scores on the five components of the FPI (Family Meals, Structure, New Foods, External Control, and Responsiveness) at posttest. Pretest scores for the five primary components of the FPI served as covariates, as well as any demographic variables found to be significantly correlated with the respective component of the FPI in preliminary analyses.

Results

Data Preparation

Appropriate scale items were reverse coded and item ranges on scales were summed to produce total scores and/or average scores. Six parent child dyads were excluded from all analyses in the proposed study due to significant incomplete data. For the External Control ANCOVA only, five additional cases were dropped (n=203) due to missing data related to maternal education, which was identified as a covariate and included in the analysis.

Preliminary Analysis

Descriptive statistics for demographic variables (including maternal age, child age, maternal immigrant status, number of years in US, employment status, and level of education) were examined for the sample. The mean age for mothers was 33.58 years and the mean age of their target children was 4.61 years old. Over 90 percent of mothers reported being born outside of the U.S. These immigrant mothers reported living in the U.S. an average of 13.41 years. Over half of mothers (61.7%) reported being unemployed. Close to half of the mothers (49%) reported not graduating from high school (See table 1).

Table 1: Demographics of Sample (n = 208)

Variables	% or Mean (SD)
Maternal Age	33.58 (7.07)
Child Age (months)	55.32 (7.01)
Maternal Immigrant status	
Immigrant	91.4%
U.S. Born	8.6%
If not born in US:	
Number of years in US	13.41 (7.13)
Employed:	
Yes	36.8%
No	61.7%
Level of Education:	
6 th grade or less	20.6%
8 th grade or less	15.3%
Some high school	12.0%
High school grad or GED	23.9%
Technical school grad	9.60%
Some college	6.20%
College grad	9.10%
Post graduate study	1.00%
Missing data	2.40%

ANCOVA Responsiveness

Assumptions. The assumption of normality was assessed and met by plotting the quantiles of the model residuals against the quantiles of a Chi-square distribution, also called a Q-Q scatterplot (DeCarlo, 1997). Visual inspection of plotted residuals against the predicted values indicated that there was homoscedasticity (Bates et al., 2014; Field, 2017; Osborne & Walters, 2002). To identify outliers, Studentized residuals were calculated and the absolute values were plotted against the observation numbers (Field, 2017; Pituch & Stevens, 2015). Studentized residuals were calculated by dividing the model residuals by the estimated residual standard deviation. An observation with a Studentized residual greater than 3.13 in absolute value, the 0.999 quantile of a t distribution with 207 degrees of freedom, was considered to have significant influence on the results of the model. No outliers were

identified. The assumption for homogeneity of regression slopes was assessed by rerunning the ANCOVA, but this time including interaction terms between each independent variable and covariate (Field, 2017; Pituch & Stevens, 2015). The model with covariate-independent variable interactions did not explain significantly more variance for Responsiveness at posttest than the original model, $F(2, 201) = 2.22, p = .111$. This implies that none of the covariates interacted with the independent variables and the assumption of homogeneity of regression slopes was met. To assess for covariate-independent variable independence, an ANOVA was conducted for each pair of covariate and independent variables (Field, 2017). There was a significant model for the Responsiveness at pretest –Condition ($\chi^2(1) = 4.77, p = .030$), however, as the covariate, Responsiveness at pretest was observed and not manipulated, therefore, the independence assumption between the covariate and the independent variable is not a necessary model assumption (Keppel & Wickens, 2007). All remaining covariate-IV pairs were not significant and met the assumption.

ANCOVA External Control

Assumptions. The assumption of normality was assessed and met by plotting the quantiles of the model residuals against the quantiles of a Chi-square distribution, also called a Q-Q scatterplot (DeCarlo, 1997). There was homoscedasticity, as assessed visual inspection of plotted residuals against the predicted values (Bates et al., 2014; Field, 2017; Osborne & Walters, 2002). To identify outliers, Studentized residuals were calculated and the absolute values were plotted against the observation numbers (Field, 2017; Pituch & Stevens, 2015). Studentized residuals were calculated by dividing the model residuals by the estimated residual standard deviation. An observation with a Studentized residual greater than 3.13 in absolute value, the 0.999 quantile of a t distribution with 207 degrees of freedom, was

considered to have significant influence on the results of the model. No outliers were identified. The assumption for homogeneity of regression slopes was assessed by rerunning the ANCOVA, but this time including interaction terms between each independent variable and covariate (Field, 2017; Pituch & Stevens, 2015). The model with covariate-independent variable interactions did not explain significantly more variance for External Control at posttest than the original model, $F(4, 193) = 0.95, p = .437$. This implies that none of the covariates interacted with the independent variables and the assumption of homogeneity of regression slopes was met. To assess for covariate-independent variable independence, an ANOVA was conducted for each pair of covariate and independent variables (Field, 2017). There was a significant model for the External Control at pretest - English Acculturation at pretest ($\chi^2(1) = 5.50, p = .020$), and Maternal Level of Education - English Acculturation at pretest ($\chi^2(1) = 17.10, p < .001$). However, as English Acculturation was observed and not manipulated, the independence assumption between the covariate and the independent variable is not a necessary model assumption (Keppel & Wickens, 2007). All remaining covariate-IV pairs were not significant and met the assumption.

ANCOVA New Foods

Assumptions. The assumption of normality was assessed and met by plotting the quantiles of the model residuals against the quantiles of a Chi-square distribution, also called a Q-Q scatterplot (DeCarlo, 1997). There was homoscedasticity, as assessed visual inspection of plotted residuals against the predicted values (Bates et al., 2014; Field, 2017; Osborne & Walters, 2002). To identify outliers, Studentized residuals were calculated and the absolute values were plotted against the observation numbers (Field, 2017; Pituch & Stevens, 2015). Studentized residuals were calculated by dividing the model residuals by the estimated

residual standard deviation. An observation with a Studentized residual greater than 3.13 in absolute value, the 0.999 quantile of a t distribution with 207 degrees of freedom, was considered to have significant influence on the results of the model. One outlier in the New Food Posttest with a Studentized residual (observation number 124) was identified, but was not excluded from the data set as it was not determined to have an appreciable effect on the analysis after running the ANCOVA without the outlier.

The assumption for homogeneity of regression slopes was assessed by rerunning the ANCOVA, but this time including interaction terms between each independent variable and covariate (Field, 2017; Pituch & Stevens, 2015). The model with covariate-independent variable interactions did not explain significantly more variance for New Foods at posttest than the original model, $F(2, 201) = 1.92, p = .149$. This implies that none of the covariates interacted with the independent variables and the assumption of homogeneity of regression slopes was met. To assess for covariate-independent variable independence, an ANOVA was conducted for each pair of covariate and independent variables (Field, 2017). There were no significant models for any combination of covariates and independent variables based on an alpha of 0.05, indicating that the assumption of independence between covariates and independent variables was met.

ANCOVA Family Meals

Assumptions. The assumption of normality was assessed and met by plotting the quantiles of the model residuals against the quantiles of a Chi-square distribution, also called a Q-Q scatterplot (DeCarlo, 1997). There was homoscedasticity, as assessed visual inspection of plotted residuals against the predicted values (Bates et al., 2014; Field, 2017; Osborne &

Walters, 2002). To identify outliers, Studentized residuals were calculated and the absolute values were plotted against the observation numbers (Field, 2017; Pituch & Stevens, 2015). Studentized residuals were calculated by dividing the model residuals by the estimated residual standard deviation. An observation with a Studentized residual greater than 3.13 in absolute value, the 0.999 quantile of a t distribution with 207 degrees of freedom, was considered to have significant influence on the results of the model. One outlier in the Family Meals Posttest with a Studentized residual (observation number 160) was identified, and subsequently excluded for this analysis ($n=207$) as it was determined to have an appreciable effect on the analysis after running the ANCOVA without the outlier. The assumption for homogeneity of regression slopes was assessed by rerunning the ANCOVA, but this time including interaction terms between each independent variable and covariate (Field, 2017; Pituch & Stevens, 2015). The model with covariate-independent variable interactions did not explain significantly more variance for Family Meals at posttest than the original model, $F(2, 201) = 1.62, p = .200$. This implies that none of the covariates interacted with the independent variables and the assumption of homogeneity of regression slopes was met. To assess for covariate-independent variable independence, an ANOVA was conducted for each pair of covariate and independent variables (Field, 2017). There was a significant model for the Family Meals at pretest-English Acculturation at pretest ($\chi^2(1) = 7.72, p = .006$); however, as the covariate, Family Meals at pretest was observed and not manipulated, the independence assumption between the covariate and the independent variable is not a necessary model assumption (Keppel & Wickens, 2007). All remaining covariate-IV pairs were not significant and met the assumption.

ANCOVA Structure

Assumptions. The assumption of normality was assessed and met by plotting the quantiles of the model residuals against the quantiles of a Chi-square distribution, also called a Q-Q scatterplot (DeCarlo, 1997). There was homoscedasticity, as assessed visual inspection of plotted residuals against the predicted values (Bates et al., 2014; Field, 2017; Osborne & Walters, 2002). The assumption for homogeneity of regression slopes was assessed by rerunning the ANCOVA, but this time including interaction terms between each independent variable and covariate (Field, 2017; Pituch & Stevens, 2015). The model with covariate-independent variable interactions did not explain significantly more variance for Structure at posttest than the original model, $F(2, 201) = 1.56, p = .212$. This implies that none of the covariates interacted with the independent variables and the assumption of homogeneity of regression slopes was met. To assess for covariate-independent variable independence, an ANOVA was conducted for each pair of covariate and independent variables (Field, 2017). There were no significant models for any combination of covariates and independent variables based on an alpha of 0.05, indicating that the assumption of independence between covariates and independent variables was met.

Primary Analyses

Research Question 1. Are child sex, maternal immigrant status, maternal English acculturation and/or maternal education associated with parental feeding practices and attitudes (Responsiveness, External Control, New Foods, Family Meals, and Structure) at pre-test among low-income, Latina mothers? The researcher hypothesized that maternal immigrant status would be significantly associated with External Control, such that immigrant mothers would be more likely to endorse higher levels of external control while

feeding their child at pretest, compared to US born mothers. No other hypotheses were proposed due to the exploratory nature of this analysis.

A Pearson's correlation analysis was conducted to assess the relationship between child sex, maternal immigrant status, maternal English acculturation, maternal education, and the five parental feeding practices and attitudes included in the FPI at pretest (i.e. Family Meals, Structure, New Foods, External Control, and Responsiveness). Cohen's standard was used to evaluate the strength of the relationships, where coefficients between .10 and .29 represent a small effect size, coefficients between .30 and .49 represent a moderate effect size, and coefficients above .50 indicate a large effect size (Cohen, 1988).

The result of the correlations was examined based on an alpha value of 0.05. A significant negative correlation was observed between maternal education and the External Control component of parental feeding practices and attitudes at pretest ($r_p = -0.19$, $p = .006$, 95% CI [-0.32, -0.06]). The correlation coefficient between maternal education and the external control component of parental feeding practices and attitudes at pretest was -0.19, indicating a small effect size. This correlation indicates that as maternal education increases, the external control component of parental feeding practices and attitudes at pretest tends to decrease. A significant negative correlation was also observed between maternal English acculturation and external control ($r_p = -0.16$, $p = .019$, 95% CI [-0.30, -0.03]). The correlation coefficient between maternal English acculturation and external control was -0.16, indicating a small effect size. This correlation indicates that as maternal English acculturation increases, external control tends to decrease. Maternal immigrant status was not found to be significantly associated with external control. No other significant correlations were found between child sex, maternal immigrant status, maternal English acculturation, maternal

education, and the five parental feeding practices and attitudes included in the FPI at pretest (i.e. Responsiveness, External Control, New Foods, Family Meals, and Structure) (See table 2).

Table 2: Preliminary Pearson correlations at pretest

	Family Meals T1	Structure T1	New Foods T1	External Control T1	Responsiveness T1
Child Sex	-0.07	-0.05	-0.07	-0.12	-0.03
Maternal Immigrant status	-0.07	-0.03	0.04	0.05	0.03
Maternal English Acculturation	0.09	0.07	0.02	-0.16*	0.03
Maternal Education	0.01	-0.09	0.06	-0.19**	-0.05

** $p < .01$ * $p < .05$

Research Question 2. Does maternal English acculturation moderate the effects of the intervention on parental feeding attitudes and practices at posttest? The researcher did not make a hypothesis about the moderation effect of English acculturation on parental feeding attitudes and practices due to the exploratory nature of the analysis.

Acculturation Moderation Effects. To examine to what extent English acculturation moderated the effects of the intervention on parental feeding attitudes and practices at posttest, five ANCOVAs were conducted (one for each feeding practice). The researcher did not propose a hypothesis about the moderation effect of English acculturation on parental feeding attitudes and practices due to the exploratory nature of the analysis.

ANCOVA Responsiveness. An analysis of covariance (ANCOVA) was conducted to determine whether there were significant differences in the Responsiveness component of parental feeding practices and attitudes at posttest by Condition (experimental vs. control) and English Acculturation (high vs. low) while controlling for the Responsiveness

component of parental feeding practices and attitudes at pretest. The results of the ANCOVA were significant, $F(4, 203) = 19.06, p < .001$, (see Table 3). The main effect for Condition was significant, $F(1, 203) = 23.79, p < .001, \eta_p^2 = 0.10$, indicating there were significant differences in Responsiveness at Posttest by Condition levels. The main effect for English Acculturation was not significant, $F(1, 203) = 0.88, p = .350$, indicating there were no significant differences of Responsiveness at Posttest by English Acculturation levels. The interaction effect between Condition and English Acculturation was significant, $F(1, 203) = 4.28, p = .040, \eta_p^2 = 0.02$, indicating there were significant differences for Responsiveness at Posttest for each factor level combination of Condition (experiment vs. control) and English Acculturation (high vs. low) interaction term (See Table 4). The means and standard deviations are presented in Table 5.

Table 3: Analysis of Variance Table for Responsiveness at Posttest by Condition and English Acculturation at Pretest

Term	SS	df	F	p	η_p^2
Condition	15.42	1	23.79	< .001	0.10
English Acculturation	0.57	1	0.88	.350	0.00
Responsiveness at Pretest	24.48	1	37.78	< .001	0.16
Condition x English Acculturation	2.77	1	4.28	.040	0.02
Residuals	131.55	203			

Table 4: Marginal Means and Standard Error for Parental Feeding Practices at Posttest by Condition and English Acculturation Controlling for Respective Feeding Practice at Pretest

	High Acculturation Group		Low Acculturation Group	
	Control MM (SE)	Experimental MM (SE)	Control MM (SE)	Experimental MM (SE)
Responsiveness	3.29 ^a (0.10)	4.17 ^{a**} (0.09)	3.66 (0.17)	4.02 (0.13)
External Control	2.74 (0.05)	2.58 (0.05)	2.81 ^{b**} (0.09)	2.39 ^b (0.07)
New Foods	3.37 (0.06)	3.93 (0.06)	3.21 (0.11)	3.97 (0.09)
Family Meals	4.07 (0.04)	4.27 (0.04)	4.04 (0.07)	4.06 (0.06)
Structure	2.97 ^c (0.08)	3.51 (0.07)	2.72 (0.13)	3.38 (0.11)

****P<.001**; Differences in means with similar superscripts were statistically significant

Table 5: Mean Values for Five Parental Feeding Practices at Posttest by the Levels of Condition and English Acculturation

	Treatment		Acculturation	
	Control Mean (SD)	Experimental Mean (SD)	Low Mean (SD)	High Mean (SD)
Responsiveness	3.48 ^a (0.93)	4.09 ^{a**} (0.87)	3.90 (0.82)	3.75 (0.98)
External Control	2.77 ^{b**} (0.48)	2.48 ^b (0.44)	2.68 (0.59)	2.60 (0.59)
New Foods	3.29 (0.61) ^c	3.95 ^{c**} (0.57)	3.68 (0.74)	3.67 (0.71)
Family Meals	4.05 ^d (0.40)	4.17 ^{d*} (0.37)	4.05 ^e (0.36)	4.17 ^{e*} (0.35)
Structure	2.85 ^f (0.74)	3.44 ^{f**} (0.69)	3.04 (0.93)	3.29 (0.82)

***P<.05, **P<.001**; Differences in means with similar superscripts were statistically significant

Post-hoc Responsiveness. Estimated marginal mean contrasts were calculated to examine the differences between the level combinations using Tukey comparisons based on an alpha of 0.05. For the main effect of Condition, the mean of Responsiveness at Posttest for control ($M = 3.48$, $SD = 0.93$) was significantly smaller than for experimental ($M = 4.09$, $SD = 0.87$), $p < .001$. For the interaction effect between Condition by English Acculturation, the mean of Responsiveness at posttest for the combination of Control Group: Low English Acculturation ($M = 3.66$, $SD = 0.81$) was not significantly smaller than for Experimental Group: Low English Acculturation ($M = 4.02$, $SD = 0.81$), $p = .336$. For the interaction effect between Condition by English Acculturation, the mean of Responsiveness at Posttest for the

combination of Control Group: High English Acculturation ($M = 3.29$, $SD = 0.81$) was significantly smaller than for Experimental Group: High English Acculturation ($M = 4.17$, $SD = 0.81$), $p < .001$. That is, only among more acculturated parents, participants in the experimental group reported higher levels of Responsiveness at posttest compared to the control group. Among the less acculturated parents, the experimental and control groups did not differ in Responsiveness at posttest.

ANCOVA External Control. An analysis of covariance (ANCOVA) was conducted to determine whether there were significant differences in the External Control component of parental feeding practices and attitudes at posttest by Condition (experimental vs. control) and English Acculturation (high vs. low) while controlling for the External Control component of parental feeding practices and attitudes at pretest. The results of the ANCOVA were significant, $F(5, 197) = 48.09$, $p < .001$, (see Table 6). The main effect for Condition was significant, $F(1, 197) = 20.11$, $p < .001$, $\eta_p^2 = 0.09$ indicating there were significant differences in External Control at Posttest by Condition levels. The main effect for English Acculturation was not significant, $F(1, 197) = 0.82$, $p = .365$, indicating there were no significant differences of External Control at Posttest by English Acculturation levels. The means and standard deviations for the main effects of Condition and Acculturation level are presented in Table 5. The interaction effect between Condition and English Acculturation was significant, $F(1, 197) = 3.97$, $p = .048$, $\eta_p^2 = 0.02$, indicating there were significant differences for External Control at posttest for each factor level combination of Condition (experiment vs. control) and the English Acculturation (high vs. low) interaction term (See Table 4).

Table 6: Analysis of Variance for External Control at Posttest by Condition and English Acculturation at Pretest

Term	<i>SS</i>	<i>df</i>	<i>F</i>	<i>p</i>	η_p^2
Condition	3.29	1	20.11	< .001	0.09
English Acculturation	0.13	1	0.82	.365	0.00
External Control at Pretest	34.52	1	211.09	< .001	0.52
Maternal Level of Education	0.46	1	2.83	.094	0.01
Condition x English Acculturation	0.65	1	3.97	.048	0.02
Residuals	32.21	197			

Post-hoc External Control. Estimated marginal mean contrasts were calculated to examine the differences between the level combinations using Tukey comparisons based on an alpha of 0.05. For the main effect of Condition the mean of External Control at Posttest for the Control Group ($M = 2.77$, $SD = 0.48$) was significantly larger than for the Experimental Group ($M = 2.48$, $SD = 0.44$), $p < .001$. For the interaction effect between Condition by English Acculturation, the mean of External Control at Posttest for the combination of Control Group: Low English Acculturation ($M = 2.81$, $SD = 0.41$) was significantly larger than for Experimental Group: Low English Acculturation ($M = 2.39$, $SD = 0.41$), $p = .001$. For the interaction effect between Condition by English Acculturation, the mean of External Control at Posttest for the combination of Control Group: High English Acculturation ($M = 2.74$, $SD = 0.41$) was not significantly larger than for Experimental Group: High English Acculturation ($M = 2.58$, $SD = 0.41$), $p = .082$. That is, only among the less acculturated parents, participants in the experimental group reported lower levels of External Control at posttest compared to the control group. Among the more acculturated parents, the experimental and control groups did not differ in External Control at posttest.

ANCOVA New foods. An analysis of covariance (ANCOVA) was conducted to determine whether there were significant differences in the New Foods component of parental feeding practices and attitudes at posttest by Condition (experimental vs. control) and English Acculturation (high vs. low) while controlling for the New Foods component of parental feeding practices and attitudes at pretest. The results of the ANCOVA were significant, $F(4, 203) = 42.41, p < .001$ (Table 7). The main effect for Condition was significant, $F(1, 203) = 64.49, p < .001, \eta_p^2 = 0.24$, indicating there were significant differences in New Foods at Posttest by Condition levels. For the main effect of Condition, the mean of the control group ($M = 3.29, SD = 0.61$) was significantly smaller than for the experimental group ($M = 3.95, SD = 0.57$), $p < .001$. (See Table 5). The main effect for English Acculturation was not significant, $F(1, 203) = 0.50, p = .480$, indicating there were no significant differences of New Foods at Posttest by English Acculturation levels. The interaction effect between Condition and English Acculturation was not significant, $F(1, 203) = 1.39, p = .240, \eta_p^2 = 0.01$, indicating there were no significant differences for New Foods at posttest for each factor level combination of Condition (experiment vs. control) and the English Acculturation (high vs. low; Table 4). That is, regardless of acculturation level, parents in the experimental condition scored higher in New Foods compared to parents in the control condition.

Table 7: Analysis of Variance for New Foods at Posttest by Condition and English Acculturation at Pretest

Term	SS	df	F	p	η_p^2
Condition	18.41	1	64.49	< .001	0.24
English Acculturation	0.14	1	0.50	.480	0.00
New Foods at Pretest	27.68	1	96.97	< .001	0.32
Condition x English Acculturation	0.40	1	1.39	.240	0.01
Residuals	57.94	203			

ANCOVA Family Meals. An analysis of covariance (ANCOVA) was conducted to determine whether there were significant differences in the Family Meals component of parental feeding practices and attitudes at posttest by Condition (experimental vs. control) and English Acculturation (high vs. low) while controlling for the Family Meals component of parental feeding practices and attitudes at pretest. The results of the ANCOVA were significant, $F(4, 202) = 56.32, p < .001$ (Table 8). The main effect for Condition was significant, $F(1, 202) = 4.25, p = .041, \eta_p^2 = 0.02$, indicating there were significant differences in Family Meals at Posttest by Condition level. For the main effect of Condition, the mean of the control group ($M = 4.05, SD = 0.40$) was significantly smaller than for the experimental group ($M = 4.17, SD = 0.37$), $p = .041$ (Table 5). The main effect for English Acculturation was significant, $F(1, 202) = 4.40, p = .037$, indicating there were significant differences in Family Meals at Posttest by English acculturation levels. For the main effect of English Acculturation, the mean of the low English acculturation group ($M = 4.05, SD = 0.36$) was significantly smaller than for the high English acculturation group ($M = 4.17, SD = 0.35$), $p = .037$ (Table 5). The interaction effect between Condition and English Acculturation was not significant, $F(1, 202) = 2.98, p = .086, \eta_p^2 = 0.01$, indicating there were no significant differences for Family Meals at posttest for each factor level combination

of Condition (experiment vs. control) and the English Acculturation (high vs. low) interaction term. That is, at the end of treatment, participants in both the experimental group (regardless of acculturation level) and those in the highly acculturated group (regardless of treatment condition) reported higher scores in Family Meals compared to the control and the low acculturated groups, respectively.

Table 8: Analysis of Variance for Family Meals at Posttest by Condition and English Acculturation at Pretest

Term	SS	df	F	p	η_p^2
Condition	0.51	1	4.25	.041	0.02
English Acculturation	0.53	1	4.40	.037	0.02
Family Meals at Pretest	22.65	1	187.63	< .001	0.48
Condition x English Acculturation	0.36	1	2.98	.086	0.01
Residuals	24.38	202			

ANCOVA Structure. An analysis of covariance (ANCOVA) was conducted to determine whether there were significant differences in the Structure component of parental feeding practices and attitudes at posttest by Condition (experimental vs. control) and English Acculturation (high vs. low) while controlling for the Structure component of parental feeding practices and attitudes at pretest. The results of the ANCOVA were significant, $F(4, 203) = 40.77, p < .001$ (Table 9). The main effect for Condition was significant, $F(1, 203) = 34.88, p < .001, \eta_p^2 = 0.15$, indicating there were significant differences in Structure at Posttest by Condition levels. For the main effect of Condition, the mean of the *control* group ($M = 2.85, SD = 0.74$) was significantly smaller than for the experimental group ($M = 3.44, SD = 0.69$), $p < .001$ (Table 5). The main effect for English acculturation was not significant, $F(1, 203) = 3.69, p = .056$, indicating there were no

significant differences of Structure at Posttest by English acculturation levels. The interaction effect between Condition and English Acculturation was not significant, $F(1, 203) = 0.34$, $p = .561$, $\eta_p^2 = 0.00$, indicating there were no significant differences for Structure at posttest for each factor level combination of Condition (experiment vs. control) and the English Acculturation (high vs. low; Table 4). That is, regardless of acculturation level parents in the experimental condition scored higher in Structure compared to parents in the control condition.

Table 9: Analysis of Variance for Structure at Posttest by Condition and English Acculturation at Pretest

Term	<i>SS</i>	<i>df</i>	<i>F</i>	<i>p</i>	η_p^2
Condition	14.47	1	34.88	< .001	0.15
English Acculturation	1.53	1	3.69	.056	0.02
Structure at Pretest	52.48	1	126.48	< .001	0.38
Condition x English Acculturation	0.14	1	0.34	.561	0.00
Residuals	84.23	203			

Discussion

The present study sought to examine the relationships of maternal English acculturation to parental feeding attitudes and practices among mother-child dyads who participated in a 7-week Spanish-language childhood obesity prevention designed to support child eating self-regulation among low-income families. The hypothesis that maternal immigrant status would be significantly associated with External Control, such that immigrant mothers would be more likely to endorse higher levels of external control while feeding their child at pretest was not supported. There was a significant negative correlation between maternal education and the external control component of parental feeding practices and attitudes at pretest, indicating a small effect size. This correlation indicated that as

maternal education increased, the External Control component of parental feeding practices and attitudes at pretest tended to decrease. Maternal education, and *not* maternal immigrant status was associated with External Control. Of note, however, a significant positive correlation was observed between maternal education and maternal immigrant status, indicating a small effect size. Thus, non-immigrant mothers in the current sample tended to report higher levels of education. As such, the current study suggests that while immigrant status and educational level are related, low maternal education seems to be a better predictor of parental use of external control feeding tactics such as goals, motivations, and threats and demands than maternal immigrant status. Neither maternal education nor maternal English acculturation were significantly related to any of the other parental feeding practices assessed. Results indicated that maternal English acculturation moderated the effects of the intervention for only two of two the five feeding attitudes and practices: responsiveness and external control. The intervention scores in the other three feeding variables (New Foods, Family meals, and Structure) were higher for the experimental group, regardless of the participant's maternal English acculturation level.

Responsiveness

Responsiveness refers to parents' recognition and appropriate response to young children's cues of hunger and satiety (Hodges et al., 2015). An overarching goal of the SEEDS prevention program (Hughes et al., 2016) was to teach parents and children to learn to recognize and respond to children's internal cues of hunger and fullness. The results of the main analysis indicated that at posttest, the experimental condition was associated with higher levels of Responsiveness. No differences in responsiveness emerged in relation to acculturation level. However, the interaction effect between Condition and English

acculturation was significant. Post hoc analyses indicated that at low acculturation, the difference between the control and experimental group was not significant. However, at high acculturation, the mean of responsiveness at posttest for the experimental group was significantly larger than for the experimental group. These results suggest that the responsiveness component of the intervention was only effective for highly acculturated mothers.

Research related to responsiveness as a feeding strategy among Latina mothers in general is very scarce, so it is difficult to find a precedent for the differences in responsiveness outcomes associated with maternal acculturation in the current study. Throughout the SEEDS prevention program, mothers were encouraged to promote the continued development of self-regulation of their target child by attending to their child's internal fullness and hunger cues, rather than utilizing excessive pressure and external control that may override optimal energy intake (Birch & Fisher, 1998). The aim of the third session of the parent portion of the SEEDS program was to help parents explore how hunger and fullness relate to healthy eating, and evaluate the role of the parent and child in feeding (the adult decided what will be served and when and where to eat; the child decides if and how much to eat). In the family session, a full-o-meter ("lino-metro") was introduced. The full-o-meter was modeled after a gas gauge seen in cars and used as a visual-tactile tool to allow children to indicate to their parents whether they were "hungry", "full", or "too full." Mothers were encouraged to query children about their fullness before, during, and after mealtimes and respond accordingly (i.e. offer their child more food, accept their child's satiety cue, or adjust responsiveness strategy at future mealtimes to prevent overeating). It is important to consider how the Responsiveness strategies taught in the prevention program,

may be better adapted for mothers with lower levels of English acculturation. It is possible that the full-o-meter tool did not translate well to this particular demographic and/or that the results of the Responsiveness component were hindered by the utilization of a mere two-item scale for measurement. Furthermore, it could be that parental responsiveness presents similarly as external control in that higher maternal education and/or maternal non-immigrant status are associated with less controlling and thus more responsive parental feeding practices. This may help explain why in regards to responsiveness, the intervention appears to have been only effective for highly acculturated mothers.

External control

External Control refers to the parental imposition of goals, motivations, and threats and demands related to children's feeding. Although previous research has revealed that parental demandingness in the form of encouragement might have a positive effect on the dietary intake of ethnically diverse, low-income children (Hoerr et al., 2009; Tovar et al., 2012), it is generally accepted that the use of external control in the form of restrictive and controlling feeding attitudes and practices hinders children's capacity for self-regulation. Thus one of the primary goals of the SEEDS prevention program was to teach mothers and children to learn to recognize and respond to children's internal cues of hunger and fullness, and discourage the utilization of excessive parental pressure/coercion or indifference/lack of involvement while feeding their children (Hughes et al., 2016). Accordingly, the 11-item External Control subscale measured parent's use of pressure, food as reward, and parental indifference during mealtimes (and importantly does not measure the possible protective factor of a less-coercive form of parental encouragement).

The results of the main analysis for the external control component of parental feeding attitudes and practices indicated that at posttest the experimental condition was associated with lower levels of External Control. However, no differences in External Control emerged in relation to acculturation level. Furthermore, the interaction effect between condition and English acculturation was significant. Post-hoc analyses revealed that at low English acculturation, mothers in the control group endorsed a significantly higher use of external control than mothers in the experimental group. This effect was not seen among highly English acculturated mothers. That is, among the more acculturated parents, the experimental and control groups did not differ in external control at posttest. These results suggest that the intervention was only effective in reducing the use of control-based feeding practices for mothers endorsing low levels of English acculturation. As noted earlier, however, approximately 5% of the variance in external control at pretest was explainable by English acculturation and maternal education. Thus, mothers reporting higher levels of education and/or acculturation were more likely to report lower levels of external control at pretest.

Previous studies have examined the association of acculturation to Latinx parents' use of control-based feeding practices with their children (Power, O'Connor, Fisher, & Hughes, 2015; Kaiser, Melgar-Quinonez, Lamp, Johns, & Harwood, 2001; Evans et al., 2011; Seth et al., 2007). In line with the current study's finding, a 2001 survey of low-income Mexican-American families with preschool children found that *higher* English maternal acculturation was associated with lower acceptance of controlling strategies such as threats, bribes, and punishments as effective feeding strategies (Kaiser et al., 2001). Furthermore, similar studies have also found that compared to their more acculturated counterparts, parents with *lower*

English acculturation were more likely to push/pressure or incentivize their children to eat, use food as a reward or to calm children, restrict children's eating for health purposes, and exhibit an overall more demanding feeding style (Seth et al., 2007; Power et al., 2015; Evans et al., 2011). Therefore, the current study lends further support for the observational trend that less acculturated parents place more pressure on their children to eat, and provides support for SEEDS as an effective child obesity prevention program targeting parents more likely to endorse the use of control-based child feeding practices.

New Foods

The New Foods subscale assessed parents' encouragement of exploration/tasting, and repeated presentation of new foods for their children. Higher scores indicated greater parental endorsement of urging, encouragement of exploration, and repeated presentation of new foods. A secondary goal of the SEEDS prevention program (Hughes et al., 2016) was to encourage parents to help their children explore and try novel foods such as fruit and vegetables. As such, throughout the 7-week SEEDS prevention program (Hughes et al., 2016), children were repeatedly exposed to novel foods, and encouraged to explore these foods with their senses. Mothers were taught that it is through exploration and repeated exposure that children come to accept new foods as palatable.

The results of the main analysis for the New Foods component of parental feeding indicated that at posttest the experimental condition was associated with higher endorsement of the New Foods component than the control condition. However, no differences emerged in relation to acculturation level. While the main effect of Condition was significant, the interaction effect between Condition and English acculturation was not significant. These results indicate that the SEEDS prevention program was equally effective among both low

and high-acculturated mothers in increasing encouragement and repeated presentation of new foods for their children. While this was a secondary goal of the SEEDS prevention program, it is an overall strength of the program, as repeated exposures to a wide variety of foods has been strongly correlated with promoting a more successful, enjoyable parent-child feeding environment and preventing feeding problems (Wardle, Herrera, Cooke, & Gibson, 2003; Birch & Marlin, 1982; Birch, McPhee, Shoba, Pirok & Steinberg, 1987; Cooke, 2007; Skinner, Carruth, Bounds, & Ziegler, 2002; Ventura & Birch, 2008). This is particularly important among low SES children (the target demographic of the current study), whose fruit and vegetable consumption may be lower than their higher SES counterparts (Cooke, 2007).

Family Meals

The Family Meals component assessed family and parental behavior around mealtimes including regularity and consistency of meal times and parental involvement in determining child's portion size, which has been associated with healthier eating practices. The result of the main analysis for the Family Meals attitude component indicated significant differences by condition and by acculturation level in endorsement of Family Meals practices at posttest. There was a significant main effect for condition, indicating that the mean score for parent-child dyads in the experimental group was significantly higher than those in the control group. Additionally, a statistically significant main effect for English acculturation indicated that the mean Family Meals score at posttest was significantly higher for the group of mothers reporting *high* English acculturation. Notably, even at pretest the mean of the *high* English acculturation group ($M = 4.10$, $SD = 0.50$) was significantly higher than that of the *low* English acculturation group ($M = 3.90$, $SD = 0.52$), $p = .01$). Thus the SEEDS prevention

program was effective in increasing reported levels of regularity and consistency of mealtimes and parental involvement in determining child's portion size regardless of parental acculturation level.

Previous studies have found that family routines provide structure, predictability, and help support the early development of social, emotional, and language development (Spagnola & Fiese, 2007; Fiese, Foley, & Spagnola, 2006; Fulkerson et al., 2006; Eisenberg, Olson, Nuemark-Sztainer, Story, & Bearinger, 2004; Fulkerson et al., 2009). Furthermore, frequency of family mealtimes have been linked to children's weight status and a more nutritious diet (Anderson & Whitaker, 2010; Taveras et al., 2005; Fulkerson et al., 2009). Inversely, a lower frequency of family meals has been related to increased consumption of soft drinks and high-fat foods (Gillman, 2000).

Session 4 of the SEEDS prevention program helped mothers and children explore appropriate portion sizes of 3-5 year old children and discuss strategies that promote children to self-serve appropriate portions. Session 6 of the SEEDS prevention program helped families learn about routines that can support children to become healthy eaters. Some barriers to maintaining routines identified by SEEDS mothers included work, being tired, and changes in schedules and childcare providers. These responses from SEEDS mothers, while anecdotal, are an indication of the challenges of low SES families in maintaining regularity and consistency of meal times and parental involvement in serving and modeling healthy portion sizes. While all families who participated in the SEEDS prevention program met poverty guidelines for qualification in the government-sponsored Head Start Program, the demographic questionnaire completed by mothers in the SEEDS prevention program did not measure income directly. However, using maternal education as a proxy measure for income

level, a significant positive correlation was observed between maternal education level and English acculturation, indicating that higher English acculturation is related to higher maternal education, and thus the possibility of higher income among the highly acculturated mothers. If this is the case, then the barriers to having consistent Family Meals may be particularly salient for mothers with low English acculturation, and thus lower overall levels of SES. Alternatively, this observed main effect of English acculturation could also be related to the fact that a disproportionate number (approximately 70%) of the mothers included in the current sample self-reported high levels of English acculturation.

Structure

The structure component assessed parent-led food practices that provide predictability in how meals are prepared and served in the home, such as measurement-based portion sizing, child involvement in food preparation, and parental monitoring of children's sweet, snacks, and high fat food consumption. The SEEDS prevention program included the secondary goals of providing families with psychoeducation on appropriate portion sizing for preschool children, healthier food options both at home and on-the-go, and the benefits of structured meal and snack routines (Hughes et al., 2016).

The results of the main analysis for the structure component of parental feeding attitudes and practices indicated that the experimental condition was associated with higher levels of endorsement of structure practices at posttest than the control group. However, no differences emerged in the relation to acculturation level. The interaction effect between condition and English acculturation was not significant. These results indicate that the SEEDS prevention program was equally effective among both low and high-accultured

mothers in increasing parental endorsement of structured meal and snack-time routines that promote healthier nutritional intake for their preschool children.

Summary of Findings

The present study sought to determine the relation between maternal acculturation and feeding practices among a sample of low-income Latina mothers with preschool children, and examine the possible interaction of parent acculturation on the effects of a 7-week family-based childhood obesity prevention program (SEEDS; Strategies for Effective Eating Development) on parental feeding attitudes and behaviors. Parental feeding practices were measured along five primary dimensions: Responsiveness, External Control, New Foods, Family Meals, and Structure. The primary goals of the SEEDS prevention program (Hughes et al., 2016) were to teach parents and children to learn to recognize and respond appropriately to children's internal cues of hunger and fullness. These primary goals were most reflected in the measurement of the Responsiveness and External Control scales of The Food Parenting Inventory (FPI; Power, Johnson, Beck, Diaz Martinez, & Hughes, 2019) used to measure parental feeding attitudes and practices. As detailed above, results indicated that Responsiveness, the portions of the SEEDS prevention program targeted at increasing maternal responsiveness to children's internal cues of hunger and fullness were only effective for highly acculturated women.

Conversely, the portions of the prevention program targeted at discouraging the utilization of excessive parental pressure/coercion or indifference/lack of involvement while feeding their children (i.e. External Control) only appeared to be effective among mothers endorsing low levels of English acculturation. Notably, however, mothers reporting higher levels of education and/or acculturation were more likely to report lower levels of External

Control at pretest. Thus, the SEEDS prevention program appears to effectively target mothers more likely to endorse the use of excessive parental pressure/coercion (Evans et al., 2011; Power et al., 2015; Seth et al., 2007)

The secondary goals of the intervention, which were increasing exposure and acceptance of New Foods, increasing the Structure and predictability of how meals are prepared and served at home, and increasing the regularity and consistency of meal times and parental involvement in determining child's portion size (Family Meals) were equally effective among mothers reporting both high and low levels of English acculturation.

These findings provide evidence of possible shortcomings of the SEEDS prevention program (Hughes et al., 2016) in effectively and equitably targeting childhood obesity prevention efforts among families reporting lower levels of maternal English acculturation as related to the parental feeding practice of Responsiveness. Notably, a disproportionate number (approximately 70%) of the mothers included in the current sample self-reported high levels of English acculturation, indicating that more research is needed to determine whether the effects seen in the current sample may be reflective of sampling distribution and/or notable differences in the reported effects of the SEEDS childhood obesity prevention program.

Limitations

The use of self-report measures for both feeding behaviors/attitudes and acculturation is a limitation to the findings of this study. As with all self-report measures, there is the potential that obtained findings may be affected by cautious responding and limited by the mono-method bias. Mothers' reports of their own behaviors, beliefs, and attitudes may also provide a limited view. With regards to acculturation, however, self-report may be the most appropriate way to measure these cultural constructs based on subjective personal

experiences and opinions. Nevertheless, these self-report measures require participants to recall events, emotions, and mood states that may differ in memory recall from their occurrence (Torres, 2010). As the study focused on mother-child dyads, it does not provide information on the possible influence of other members of the household during mealtimes. Furthermore, while the FPI met criteria for validation in this sample, it is a new measure, and future studies should replicate the component structure of the FPI.

Generalizability is another limitation to be considered, as all mothers were low-income Latinas that spoke Spanish. Though the inclusion criteria of the sample allow for a more microscopic and informed view for this particular demographic group and their preschool children, it also limits the applicability of findings.

Lastly, another limitation related to the measurement of cultural adaptation (i.e. acculturation and enculturation) was the inability to capture the possible moderating role of enculturation due to limited variability in the Spanish domain score. A majority of mothers self-reported high levels of English acculturation, which may have also affected the ability to properly capture the experience of mother's with a self-reported low level of English acculturation. The use of median splits to categorize participants into high vs. low acculturative groups involves the conversion of continuous scores into categorical data results, which can result in a loss of variability and power to detect statistically significant effects. These are some of the continued difficulties of measuring the cultural adaptation process seen throughout the literature, which is reflective of the myriad variables and situational contexts that make up the complexities of the human experience and behavioral change as a whole.

Relevance and Implications

From its inception, the field of Counseling Psychology has maintained an emphasis on a systems-based and multicultural perspective in mental health. The field of psychology has continued to advance theory and reexamine immigrant issues in mental health. In 2013, the first Latino president of the American Psychological Association, Dr. Melba Vasquez, issued a Presidential Task Force on Immigration, a call to action to both raise awareness of this growing but poorly understood population and to encourage the advancement of research within this domain (APA, 2013). The present study would follow this line of inquiry by examining correlates of obesity, a health disparity that disproportionately affects Latinx children. By examining possible moderation effects of acculturation on a culturally based childhood obesity prevention program, important information can be gleaned with the potential to improve prevention and/or intervention efforts and help decrease the risk for childhood obesity in Latino families.

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