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Title: Influence of Parental Acculturation on Family Meals, Parent Child-Feeding Behaviors, and Child Eating Patterns and Habits in Asian and Hispanic Families

Abstract approved:

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Acculturation, defined as the process of adopting the behaviors and beliefs of the dominant host culture, is often associated with dietary change and negative health outcomes, such as increased risk for obesity and diet-related diseases. The large and rising immigrant population in the U.S. necessitates a better understanding of the acculturation process in order to design appropriate health and nutrition interventions. It is well established that parents play a key role in child and preadolescent nutrition through parenting style and control of the home food environment. However, little is known about the potential influence of parental acculturation on preadolescent children's dietary patterns and habits, frequency and characteristics of family meals, and parent child-feeding behaviors, particularly among families who have lived in the U.S. for a considerable time and whose children have grown up in the U.S.

The objective of this study was to quantitatively examine the association between parental acculturation and parent child-feeding behaviors, family meals, and child dietary patterns and habits in families where the primary food-providing parent self-identified as Asian/Asian American ("Asian") or Hispanic/Latino ("Hispanic"). Nativity was used as a proxy measure of acculturation, with foreign-born (FB) parents assumed to be less acculturated than native-born (NB). Sampled participants from nine states consisted of 74 Asian and 134 Hispanic parents or caretakers and their preadolescent children.

Survey questions addressed children's intake of foods considered typical of the American diet to determine associations between frequency of consumption and parental nativity. Parent child-feeding behaviors examined were parental encouragement of milk-drinking and breakfast consumption, and discouragement of soda-drinking. Lastly, associations between frequent family meals and meals away from home and parental nativity were examined.

Among Asian participants, no statistically significant associations were found between child intakes, family meals, or parenting behaviors among NB versus FB parents. However, among the Hispanic group, parental nativity was significantly associated with several variables. Children of NB parents were more likely to frequently consume hamburgers or hot dogs with cheese, chocolate bars, cupcakes or cake, and soda. By contrast, children of FB parents were more likely to consume raw broccoli and pancakes, waffles, or French toast frequently. NB parents had greater odds of encouraging children's milk intake at lunch. Families with NB parents also

had significantly greater odds of consuming dinner together five or more days per week.

The findings of this study suggest that parental nativity may have some influence on children's dietary patterns and habits, parent child-feeding behaviors, and family meals among Hispanics. More research is needed in larger, more representative, and culturally specific samples. The results of this study suggest that nutrition interventions targeting Asian and Hispanic families with preadolescent children may benefit families with a wide range of parental acculturation, although some interventions may be slightly more applicable to the more or less acculturated. Potential areas for intervention include coaching parents on effective child-feeding behaviors and strategies for fostering healthy eating practices, promoting quality family meals, and educating parents on the health risks and sources of excess sugar.

Influence of Parental Acculturation on Family Meals, Parent Child-Feeding Behaviors, and Child Eating Patterns and Habits in Asian and Hispanic Families

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Dean of Graduate School

I understand that my thesis will become part of the permanent collection of Oregon State University libraries. My signature below authorizes release of my thesis to any reader upon request.

Julie E. Thomas, Author

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TABLE OF CONTENTS

TABLE OF CONTENTS (Continued)

Page

LIST OF TABLES

LIST OF TABLES (Continued)

Table Page

Influence of Parental Acculturation on Family Meals, Parent Child-Feeding Behaviors, and Child Eating Patterns and Habits in Asian and Hispanic Families

Introduction

Asians and Hispanics[i] constitute the largest immigrant populations in the United States.[3] According to the 2010 United States Census,[4] Asians and Hispanics are the fastest growing racial/ethnic minority populations in the U.S. and Hispanics now make up one in six Americans. Largely due to these large and growing populations, immigrant health is and will continue to be a prominent issue among health practitioners in the U.S.[3] Immigrant health is often significantly affected by lifestyle changes, including dietary changes, associated with exposure to the mainstream U.S. culture.[3] The process by which an immigrant adopts the behaviors and beliefs of the dominant host culture is described as acculturation.[5] Changes in diet frequently occur upon immigration and during the acculturation process. Adoption of foods and dietary practices common to the host culture is known as dietary acculturation.[3] Acculturation and associated dietary acculturation have been linked to both positive and negative health outcomes and as a result are a growing area of study across several disciplines.[3,6–8]

The proportion of overweight and obese individuals in the U.S. is rising at an alarming rate.[9] With these rising rates come significant financial repercussions for

[i] The terms Hispanic and Latino are frequently used interchangeably in the literature.[1] In this thesis, the term Hispanic will be used in concordance with the U.S. Department of Health and Human Services. This term refers to individuals of all races who have Spanish-speaking heritage and Mexican, Puerto Rican, Cuban, Dominican, Central American, or South American ancestry.[2]

society and health consequences for the overweight and obese.[10,11] Overweight and obesity are associated with increased risk of developing numerous lifestyle diseases including type 2 diabetes and cardiovascular disease.[9] For Asian and Hispanic immigrants, acculturation and associated dietary change are often associated with weight gain, which increases their risk of developing these chronic diseases.[3,12]

Some studies[13,14] have reported negative health and behavioral outcomes associated with acculturation for adolescent immigrants. Compared to their less acculturated counterparts, these outcomes include more missed school days due to physical or emotional problems, higher rates of asthma and obesity, more violent behaviors, and greater incidence of risky behaviors such as not wearing seatbelts and having sexual intercourse at a younger age.[13,14]

In contrast, some studies have found positive health outcomes associated with acculturation. For example, Raj et al.[15] found that Asian Indians who had lived in the U.S. for more than ten years consumed less saturated fat than those who had been in the U.S. for less time. Studies on Hispanic immigrants have found that acculturation is associated with increased physical activity[8] and greater food security.[16]

The family serves as another important influence on dietary patterns and habits.[17,18] In the U.S., family meals are associated with numerous social, psychological and health benefits for both parents and children.[17,19,20] For example, children who belong to families who eat together frequently have improved nutritional status[20,21] and tend to experience greater academic success.[19] However, there is limited published research examining an association between frequency of family meals and acculturation. Having a

greater understanding about the occurrence and nature of family meals in immigrant families may help in promoting positive health and behaviors during the acculturation process.

Parents are highly influential on children's eating patterns and habits, and their child-feeding behaviors can greatly impact children's nutrition.[22–25] There is some evidence that children adapt to an American diet more quickly than their foreign-born parents due to their experiences at school.[26–28] However, it is not well understood how eating patterns and habits differ between children who have grown up in the U.S. but whose parents have different acculturation levels. Eating patterns and habits developed at a young age can persist for a lifetime and have lasting health consequences.[25] Therefore, it is important to examine the association between parental acculturation and the eating patterns and habits of children. Other aspects shaping the home food environment, including family meals, are potentially associated with parental acculturation and should be examined in light of their impact on children's health. Having a better understanding of these relationships will guide future research and enable nutrition professionals to construct appropriate targeted nutrition interventions for these large and growing populations.

Operational Definitions

Operational definitions of terms used throughout this thesis are provided below.

Dietary patterns and habits typically refer to consumption frequency of foods and meals as well as meal characteristics. For the current research, dietary patterns and habits of children are illustrated by the frequency of consumption of specific foods (defined under hypotheses) and breakfast. Meal characteristics are examined only in the context of family meals.

Parent child-feeding behaviors refer to parenting behaviors related to children's eating patterns and habits.[29] They reflect general parenting styles but can differ by child and context.[29] Parent child-feeding behaviors are often described by parental restriction, monitoring, or encouragement of children's food intake.[30] The current research examines parent child-feeding behaviors through parental encouragement of children's breakfast and milk consumption as well as parental discouragement of soda drinking.

Research Objective

The purpose of this study is to examine the association between parental acculturation and frequent intake of specific foods and meals by preadolescent (9-14 year old) children, frequent consumption of family meals, including meals away from home, and regular occurrence of specific parent child-feeding behaviors. Acculturation will be measured by whether the primary food-providing parent or caretaker ("parent") was born in the U.S. ("native-born," or NB) or in a foreign country ("foreign-born," or FB). For inclusion, the primary food-providing parent must self identify as Asian/Asian American ("Asian") or Hispanic/Latino ("Hispanic"). Comparisons will be made within but not between racial/ethnic groups.

Research questions:

1. Is there an association between parental acculturation and preadolescent children's eating patterns and habits? What differences are apparent between the eating patterns and habits of children whose parents are NB versus FB?
2. Is there an association between parental acculturation and parent child-feeding behaviors? Are behaviors positively or negatively associated with acculturation?
3. Is there an association between parental acculturation and frequent consumption of family meals? Are family meals positively or negatively associated with acculturation?

4. Is there an association between parental acculturation and frequent consumption of meals away from home? Are meals away from home positively or negatively associated with acculturation?

Objectives of research findings

1. Explore potential explanations for or implications of study findings with respect to previous research and sample characteristics.
2. Examine supplemental data (primarily characteristics of family meals and meals away from home) to enhance understanding of findings.
3. Identify areas of focus for future research and nutrition intervention.

Hypotheses

All null hypotheses stated below will be tested separately for Asian and Hispanic respondents. Acculturation level will be measured by nativity; NB parents are assumed to be more acculturated than FB parents.

Children's Eating Patterns and Habits

1. There will be no association between parental acculturation and frequent consumption of common American[ii] desserts (chocolate candy bar; frozen yogurt or ice cream; cupcakes or cake) by children.
2. There will be no association between parental acculturation and frequent consumption of common American entrée foods (pancakes, waffles, or French toast; hamburger or hot dog; macaroni and cheese; pizza; cold cereal) by children.
3. There will be no association between parental acculturation and children's frequent consumption of vegetables (broccoli and carrots) commonly consumed in the U.S.
4. There will be no association between parental acculturation and frequent intake of common American beverages (soda; fruit flavored drinks; juice; and milk) by children.

[ii] For simplicity, foods commonly consumed in U.S. mainstream culture will be denoted as "American foods." These foods and beverages may also be consumed in other countries and may not have originated in the U.S.

5. There will be no association between parental acculturation and children's tendency to skip breakfast.

Parent Child-Feeding Behaviors

6. There will be no association between parental acculturation and parent reports of "most of the time" or "always" trying to get children to consume breakfast.
7. There will be no association between parental acculturation and parent reports of "most of the time" or "always" trying to get children to drink milk at meals and snacks.
8. There will be no association between parental acculturation and parent reports of "most of the time" or "always" trying to get children to drink less soda.

Meal Behaviors

9. There will be no association between parental acculturation and frequent consumption of meals away from home, including fast food, take out, and having food delivered.
10. There will be no association between parental acculturation and frequent consumption of breakfast as a family.
11. There will be no association between parental acculturation and frequent consumption of lunch as a family.

12. There will be no association between parental acculturation and frequent consumption of dinner as a family.

Having more information about behaviors and lifestyles of immigrant families will help dietetics and health practitioners begin to understand how best to guide them toward achieving better health or prevent the occurrence of poor health outcomes frequently associated with acculturation. This study is nonrepresentative and does not adequately take into account the many cultures and countries of origin of Hispanic and Asian immigrants; it should be noted that its intention is not to stereotype or generalize but to explore the associations between acculturation and parent child-feeding behaviors, child eating patterns and habits, and family lifestyle from a broad perspective and to consider applications to dietetics practice. Findings from this study can be used to generate representative, culture-specific research to deepen our understanding of these associations and create improved nutrition intervention strategies.

Literature Review

Related research is presented first by general topics related to the current study, including acculturation, eating patterns and habits, family meals, and parent influence on children's eating practices. Although some references to acculturation studies are made in the discussion of general topics, findings from related acculturation studies on Asians and Hispanics are primarily presented in the final section.

Acculturation

Acculturation is an emerging area of study across numerous disciplines, including nutrition, public health, and the social sciences. Acculturation lacks a uniform theory and consensus for measurement.[31] Researchers have developed various models describing acculturation as either a unidimensional, bidimensional or multidimensional process. Because of the numerous descriptions of the acculturation process, a variety of scales and single-item measures exist for assessing acculturation levels. Acculturation scales are often specific to certain countries of origin, such as the Acculturation Rating Scale for Mexican Americans,[32,33] and thus cannot be applied across multiple populations. The inconsistencies in measurement of acculturation make comparisons between acculturation studies difficult; comparisons must be cautiously interpreted.

Single-item measures of acculturation, or proxy measures, are commonly used and generally consist of nativity, length of residence, generational status, and language use or proficiency.[3,34,35] Language use is the most common proxy measure of acculturation[34,35] but can be problematic if some groups being studied come from

countries where English is a common language.[31] Limitations of these measures are inherent and misclassification is common.[31,35] For example, foreign-born individuals may emigrate at a very young age and more closely resemble native-born individuals in their level of acculturation. Despite error associated with misclassification, proxy measures remain the most practical measures, particularly for health practitioners with limited information and resources.[36] Single-item measures are most commonly used to measure acculturation in large population surveys such as the National Health Interview Survey (NHIS) and National Health and Nutrition Examination Survey (NHANES).[34,35]

Health Outcomes Associated with Acculturation

Acculturation has been associated with poorer dietary habits[12,37] and negative health outcomes[3,6,12,38,39] in many studies. The "healthy immigrant effect"is frequently discussed in acculturation literature and describes the tendency of recent immigrants to the U.S., Canada and other developed countries to be healthier upon arrival in the host country than after they acculturate.[40,41]

Negative health outcomes associated with acculturation often appear to be related to dietary change.[3] In a sample of first generation Hispanic immigrants, Akresh[7] found that more acculturated individuals with high levels of dietary change reported having worse health since migrating to the U.S. Pérez-Escamilla[12] further noted that the majority of acculturation studies on Hispanics and weight status point to a positive association between acculturation and obesity. Acculturation has also been associated with increased risk of chronic diseases including diabetes and cardiovascular disease for Asians and/or

Hispanics.[3,6,38,39,42,43] Some results are inconsistent with these findings; Pérez-Escamilla[12] reviewed numerous acculturation studies and found no consistent trend in the association between type 2 diabetes and acculturation for Hispanics.

Unger et al.[44] reported decreased levels of physical activity with acculturation for both Asian and Hispanic early adolescents. However, a review article[8] conflicts this finding for Hispanics, reporting increased levels of physical activity with acculturation in the majority of studies on Hispanic populations. Pérez-Escamilla[12] speculated that this increase in physical activity may counter the increase in poor diet and obesity that tends to occur with acculturation, therefore helping to reduce the risk of type 2 diabetes.

In a study of diet, physical activity, and preventive health behaviors of adolescents, Allen[13] showed that length of exposure to U.S. culture may have an effect on preventive health behaviors of immigrants, but that the length of exposure may differ by ethnic group. For example, when differences existed between Asian Americans and non-Hispanic whites, they were present only for the first generation, but differences between Hispanics and non-Hispanic whites existed across all generations or appeared in later generations.[13]

Dietary Acculturation

Dietary change associated with acculturation is frequently referred to as dietary acculturation. Dietary acculturation is defined more precisely by Satia-Abouta et al.[3] as "the process by which immigrants adopt the dietary practices of the host country." Dietary acculturation is frequently measured by analysis of consumption frequencies of foods common to either the immigrant's native culture or to the host culture. For example, in a study on dietary acculturation in Korean Americans, researchers measured the extent to which kimchi, a traditional Korean dish, was prepared at home in the U.S.[45] Following immigration, a family may incorporate foods common to mainstream American culture into their diets.

Dietary acculturation is frequently evident by examining food choices at different meals. For example, for some immigrants, breakfast is the first meal to be acculturated because it is the least culturally important[46]; lunch follows because of increased exposure to host country meals at that time of day.[47] Dinner is often the most culturally important meal and last to be acculturated.[26,47]

Factors providing a potential buffer against dietary acculturation include living in an ethnic enclave,[48] having a social network comprised primarily of coethnics,[7] not speaking English,[47] not being employed outside the home,[47] and living with older relatives.[7,38] Several factors may contribute to dietary acculturation, such as having a U.S.-born spouse,[7] and socializing outside of one's ethnic group.[7] Additionally, adoption of American foods may have occurred prior to emigration for some individuals. For example, many Asian countries have experienced rapid industrialization in recent

decades, resulting in greater exposure to American foods for some Asians.[49] Raj et al.[15] mentioned, for instance, that some Asian Indians came to the U.S. with a preexisting preference for processed American foods.

Role of Food in Immigrant Lifestyles and Identities

For immigrants, food often plays an important role in maintaining or establishing identity within a new country.[50] In some cases, part of establishing a new identity has meant embracing foods attributed to the country of origin which were previously unknown as a result of regional or economic differences or due to adaptation by the receiving culture.[50] Many Italians, for example, left a life of poverty and emigrated to the U.S. in the early twentieth century.[50] There they embraced the American notion of Italian food, which although unfamiliar to them represented an identity and lifestyle that was of higher status than what they had known in Italy.[50] Due to this phenomenon as well as factors affecting food choices discussed below, it cannot always be assumed that consumption of so-called "ethnic foods" will be greater for less acculturated individuals. Furthermore, unless examining a relatively homogeneous population, it is inappropriate to assess consumption of traditional foods as a dietary acculturation measure.

Zanger[51] stated that food provides comfort to immigrants amid the confusion and stress caused by adaptation to a new life and host country. However, popularization of ethnic foods over time has resulted in them becoming blander and less authentic in an effort to attract the general public. This idea is supported by a qualitative study[28] on Mexican immigrants, who reported that Mexican food, even food made from scratch with

ingredients purchased in the U.S., did not taste the same as it did in Mexico. One participant reported that it took 2-3 years to adapt to the taste of Mexican food prepared in the U.S.[28]

Zanger[51] noted that to some extent the Americanization of ethnic foods may deny children of immigrants their culinary heritage; due to greater familiarity, later generations may come to prefer the "mainstream" versions of their traditional foods and better identify with them than with their more authentic counterparts.

Another growing phenomonen influenced by the rise in international travel and the increased availability of ethnic foods is the popularity of "fusion" cuisine, which is characterized by merging flavors and ingredients of various ethnic foods.[52] One study[28] found that fusion foods were incorporated into the eating practices of Mexican immigrant families as a means of balancing taste preferences, cost and/or availability of foods. For example, one Mexican American mother reported cooking turkey, which she described as an American food, but preparing a mole sauce to accompany it.[28]

Eating Patterns and Food Choice

Inconsistent data exist on the nutritional impact of having numerous eating occasions within the course of a day.[53] Among adolescents, Dwyer et al.[54] showed that number of eating occasions was positively associated with increased intake of energy, carbohydrate, and sugar, and decreased protein, sodium and fat intake. Sugar consumption was shown to be highest at snacks and breakfast, and breakfast was the meal most frequently skipped.[54] However, according to de Graaf,[53] skipping breakfast has

a negative effect on cognitive functioning and is associated with increased fat intake and higher rates of obesity. Additionally, Cluskey et al.[23] reported that adolescents' diet quality is improved by breakfast consumption.

It is important for practitioners to understand eating behaviors and food choice in order to help individuals develop healthier eating habits.[55] Jastran et al.[55] found that U.S. adults attempt to find balance between personal values and circumstances when establishing their eating routines and making food choices. Similarly, Sobal and Bisogni[56] proposed a food choice process model, which posits that food choices fit into the context of an individual's lifestyle, life experiences, culture, and identity, and that individuals establish guidelines for making food decisions that are consistent with their personal values. Khare and Inman[57] further explained that eating habitual foods and having eating routines takes pressure off of individuals to constantly make food choices and behavioral decisions. They found that despite some between- and within-meal variation, there are underlying patterns to food choices.[57] Studies on food choices of Asian and Hispanic immigrants reflect these findings and are discussed below.

Meals

Despite their importance and prevalence across cultures, meals lack a consistent definition.[58] Meals are most generally defined as a specific amount of food consumed at a particular time, but this definition omits the social component of meals.[58] Meals can be considered in terms of amount of food, time of day, number of courses, food characteristics, and company.[59] They can alternatively be defined by their nutritional

significance, thus separating them from other eating occasions such as snacks.[58] Most cultures follow a pattern of three meals per day, and include distinct words for breakfast, lunch and dinner, but differ in which meals are most culturally important.[58] Dinner is the largest meal across many cultures[60] but lunch is traditionally the main meal in Mexico.[43] Breakfast is typically the smallest meal and is most frequently skipped.[60] In a study of Swedish adolescents, Sjöberg et al.[61] discovered that irregular breakfast and lunch consumption were associated with unhealthful lifestyle behaviors and eating habits.

Family Meals

Meals are highly social events and are a way for families to honor tradition.[59] Cultural values, eating behaviors, and food preferences are learned through family meals.[59,62] Vallianatos and Raine[63] reported that food and meals also allow immigrant parents to pass on religious and traditional customs of their native culture to their children. Family meals provide an opportunity for family bonding, story sharing, and problem solving.[19,64] Contrary to common beliefs, both parents and adolescents value time spent with family during meals.[65] Adolescents are often instrumental in getting families to adopt new foods.[58]

The psychological, behavioral and health advantages of family meals for children and adolescents has been well documented in the literature. However, the research that follows reflects mainstream U.S. culture and does not adequately address subpopulations. According to Hutson,[19] children experience greater academic success and higher self-esteem when they eat with their families four or more times per week. Another study[66]

controlled for potential confounders found negative associations between family meals and adolescent problem behaviors such as smoking, alcohol use, property destruction, and running away from home. Mellin et al.[67] reported that females with disordered eating were more likely to belong to families with low frequency of family meals.

Family meals can be beneficial to parents as well as children. In a study of U.S. IBM employees, Jacob et al.[68] found that family dinners mediated the negative association between work hours and perceptions of family and personal success.

Family meals are also important nutritionally. Consuming meals frequently as a family can contribute to higher intakes of fruits and vegetables, calcium-rich foods, and grains.[20] One study[21] reported that they are also related to decreased consumption of soda and fried foods, and are associated with healthier eating overall. Nutrient-wise, family meals contribute to increased intake of protein, iron, folate, calcium, fiber, and vitamins A, C, E, B6, and B12[20,21] and decreased fat intake.[21]

A study[69] on low acculturated Hispanic families found that children eating breakfast, lunch, or dinner with their families four or more times per week were more likely to consume fruits and vegetables five or more times per week than those who ate with their families less often.

Despite the advantages of family meals, their incidence is decreasing in the U.S.[17,65,70] According to seventh and tenth grade adolescents, barriers to eating with families include busy schedules, aversion to foods served, discord among family members, and desire for greater autonomy.[65]

Activity and work schedules have been shown to be major contributors to decreased family meals in other studies.[17,23,71] Working parents often find it difficult to manage meal organization and demands of their families, which can lead to increased stress.[72] They often turn to restaurants and fast food but still usually attempt to turn such occasions into valuable family time.[17,71] One study[17] found that family dinners increase and eating fast food decreases as parents have greater work hour flexibility. Neumark-Sztainer et al.[20] reported that frequent family dinners were positively associated with being Asian American, having an unemployed mother, and being of higher socioeconomic status. In contrast, Sweeting and West[73] found that in the United Kingdom, there was no association between family meals and healthy eating practices of children. After adjusting for socioeconomic status, they further found that children with unemployed mothers had less healthy eating practices than those with employed parents.[73]

In a study consisting of interviews with Asian, Hispanic, and non-Hispanic white parents of 10-13 year old children, dinner was reported as the meal most often eaten together as a family, usually around the table and on rare occasions in front of the television.[23] Non-Hispanic white parents reported having scheduling conflicts with family dinners more often than Asian and Hispanic parents.[23] Children often prepared breakfast for themselves and it was rarely eaten together as a family.[23]

In studies on Asian and/or Hispanic children and adolescents, lunch is typically eaten at school rather than with family, and usually consists of cafeteria food or food

brought from home.[23,26,74] Lunches brought from home often consist of American food such as sandwiches.[23,26]

Meals Away From Home

Meals away from home include restaurant meals, fast food, take out, or delivery.[23] Eating away from home occurs for many reasons, especially for special occasions, desire to avoid cooking, or lack of time for meal preparation due to busy work and activity schedules.[23] However, eating away from home is associated with poorer nutrition, including increased intake of fat and energy and decreased intake of fiber and calcium.[33,75,76] Furthermore, studies have shown that consumption of foods away from home is positively associated with increased body fat.[75]

Adolescents are consuming a greater percentage of their nutrients from foods away from home than in recent decades.[76] From interviews with Asian, Hispanic, and non-Hispanic white parents of 10-13 year old children, Cluskey et al.[23] found that Asian and Hispanic parents were less likely than non-Hispanic white parents to report eating meals away from home once per week or more. Asian parents reported the lowest frequency of consuming meals away from home.[23] Cluskey et al.[23] reported that for those families who consumed meals away from home infrequently, special occasions, socializing children, and having quality time with friends and relatives were primary reasons for doing so. Families who consumed meals away from home frequently reported convenience as a main reason.

Parent Influence on Children's Eating Patterns and Habits

Children's eating patterns and habits are influenced by parental attitudes, behaviors and feeding styles.[77] For example, in one study on Hispanic adolescents, mothers were found to be highly influential in their children's intentions of consuming a healthful diet.[78] Casey et al.[24] examined the food choices of mixed race/ethnicity seventh and tenth grade adolescents and found parents to be highly influential. Parent influence on food choice was observed in the following areas: food availability, rules, role modeling, cooking, family culture and religion, family relationships, importance of nutrition, and family meals.[24] Orlet Fisher et al.[79] also showed that parents' food choices can affect those of their children; mothers' milk consumption was positively associated with their daughters' milk consumption and the same relationship was observed for maternal soda intake. Further, researchers observed an inverse relationship between consumption of soda and milk.[79]

Parenting Style and Child-Feeding Practices

Parenting feeding styles can significantly impact children's health. Children's inherent preferences and abilities to accept foods were protective mechanisms in times of food scarcity, but in today's environment of food abundance can lead to overweight and obesity.[25] Some parent child-feeding styles and practices can significantly contribute to this risk.[25] Four main parenting styles have been identified based on two dimensions: demandingness and responsiveness.[80] Demandingness is described by parent control and supervision, while responsiveness refers to parent involvement, affection, and

acceptance.[80] Parenting styles described by Hughes et al.[80] include authoritative (high demandingness/high responsiveness), authoritarian (high demandingness/low responsiveness), indulgent (low demandingness/high responsiveness), and uninvolved (low demandingness/low responsiveness), and these have important implications for child-feeding and heath. Studies in the U.S. have generally shown more positive child outcomes associated with the authoritative parenting style versus other styles.[25,81] In contrast, studies conducted in Asia have shown greater use of and positive outcomes from the authoritarian parenting style among Asian populations.[81] However, one study[82] on Asian American college students showed that among highly assimilated students, greater parental use of the authoritative style was associated with lower family conflict, while the opposite was true for the authoritarian style. Researchers speculated that use of the authoritarian style may be more associated with adherence to Asian cultural values.

Positive outcomes associated with the authoritative parenting style in the U.S. include child nutrition; positive eating behaviors and lower BMI tend to be associated with authoritative parenting styles, while authoritarian styles are typically associated with negative child feeding outcomes and higher BMI.[25] For example, Patrick et al.[83] found that among low income Hispanic parents, authoritarian child-feeding style was associated with lower intake of fruits and vegetables by preschool-aged children. In a study containing a small proportion of Asian and Hispanic adolescents, Berge et al.[84] found a positive association between authoritative parenting style and frequency of family meals.

To date, few studies have examined parenting styles and child-feeding behaviors among ethnic/racial minorities,[80] and the majority of studies examine parents of young children. One small sample study on low income Vietnamese and Cambodian parents of 2-6 year old children revealed high levels of indulgent parenting.[85] Among low income Hispanic parents of preschoolers, Hughes et al.[80] found that 38% were authoritarian and 38% were indulgent, compared with 15% authoritative. Indulgent parenting was associated with the highest child weight status. Sanchez-Sosa et al.[86] examined parenting styles (not exclusive to child feeding) among Mexican, foreign- and native-born Mexican American, and NHW parents of 10-14 year old children, and found that Mexican American parents exhibited greater use of authoritarian practices than Mexican or NHW parents. They speculated that use of the authoritarian parenting style may be in response to the effects of acculturation. However, among all parent groups in the study, authoritative parenting was the most common style. Differences between groups were independent of socioeconomic status of the parents.

Arredondo et al.[32] examined parenting styles in relation to children's healthy eating and physical activity among a sample of Hispanic parents with young children. Healthier eating was associated with positive reinforcement and monitoring by parents and less healthy eating was associated with controlling parenting behaviors.[32] Parents who were less controlling tended to be more acculturated.[32] Sterba et al.[87] found that strategies employed by low acculturated Hispanic mothers to encourage preschool-aged children's healthy eating included role modeling, providing incentives to reinforce good behavior, introducing children to new foods, and preparing foods creatively.

Interviews with Asian, Hispanic, and non-Hispanic white parents of preadolescent children revealed that many parents create expectations around milk and soda consumption for their children; many children were not allowed to consume soda regularly with meals.[23] It was also revealed that parental rules and expectations strongly impacted calcium intake in these children.[22]

Related Acculturation Studies on Asian and Hispanic Populations

Many studies have examined acculturation and eating patterns and habits of Asian and Hispanic immigrants. Several studies, especially on Asian immigrants, examined pre- and post-migration diets and are included below. All studies relate to acculturation in the U.S. except where otherwise noted. Two studies[32,87] examined parent child-feeding behaviors and acculturation and were described above in the section on parent influence. With the exception of meals away from home, only one study[69] described above was found relating acculturation to frequency and nature of family meals but the study did not differentiate between acculturation levels. This remains an area that needs to be explored to better understand immigrant family relations and the health and behavioral outcomes of acculturation.

Little research was found which specifically examined differences in children's diets based on parent acculturation level. One study[47] on Pakistani immigrants to the United Kingdom examined differences in three-year-old children's diets based on their mothers' generational status (first or second generation). Researchers discovered few significant differences between children's diets. Foods that increased significantly with

maternal generation were fish and chips, breakfast cereal, and sugar-sweetened milk. The researchers noted that the low occurrence of significant differences may have been due to the cohesiveness of the Pakistani community.[47]

Overview

Related studies are described below according to findings that may be relevant to the current study. Due to the lack of consensus regarding research methods for acculturation studies, the studies included in this review utilized numerous definitions and measures of acculturation. Additionally, research varied by study population. This lack of uniformity makes comparisons between studies difficult.

Studies on Asian immigrants examined individuals from numerous countries of origin. Based on census data from the states involved,[88] the majority of Asian respondents in the current study were likely of Japanese, Chinese, Filipino, Vietnamese, and Asian Indian origin. Related research on Hispanic immigrants focuses largely on Mexican Americans. While this heightens the potential for misinterpretation of findings, there is some evidence that the majority of the Hispanic sample in the current study was of Mexican descent. With the exception of Hawaii, all states from which Hispanic respondents were recruited for the current study have a majority Mexican-origin Hispanic population.[88]

Despite their limitations, some general trends emerge from previous acculturation research. Greater income and education typically contribute to higher levels of

acculturation[6,27,37,45,89–92] but their effects on diet and health are inconsistent. For Asian and Hispanic immigrants, frequency of meals away from home[33,44,45,90,93] and consumption of American foods[26,27,43,45,93–97] typically increases with acculturation. Children often consume more American foods than their parents, and frequently have a preference for American foods.[26–28,38]

Major factors affecting food choice and dietary acculturation are cost, convenience, availability, familiarity, nutrition knowledge, health beliefs, and family preferences, including having older relatives in the home.[28,38,74,87,95] Decreased dietary quality[7,13,43,90,91,93,96,98–100] and increased BMI[12,43,90,101] are positively associated with acculturation in many studies. Dietary change associated with acculturation and/or migration often results in increased intake of fats,[12,45,96,100,102,103] sweets and salty snacks,[15,93,95,104] convenience foods,[43,47,74,95,103,105] and sugar sweetened beverages[12,13,43,106] and decreased intake of fruits and vegetables,[12,13,89,90,96,100] and several vitamins and minerals.[45,89] Conflicting results exist and are described below.

Appendix A outlines key studies included in this review by population, acculturation measure, sampling design and location, and major findings.

Sociodemographic Factors

The effect of socioeconomic status on acculturation and health outcomes is inconsistent for Asian immigrants.[31] However, acculturation is positively associated with socioeconomic status in many studies on Hispanic immigrants.[12] Gordon-Larson et al.[90] speculated that sociodemographic factors such as income, education, and geographic

location may have profound effects on acculturation and health behaviors due to high or low contact with mainstream American culture, opportunities for physical activity, and access to ethnic and American foods. They explained that for many Americans, being of low socioeconomic status can lead to unhealthy lifestyle behaviors due in part to living in neighborhoods with low opportunities for physical activity and high availability of fat- and calorie-dense foods. They suggested that among immigrants with low socioeconomic status, high retention of culture of origin lifestyles may provide some protective effect against these potentially negative outcomes.

Income

In most acculturation studies, income is positively associated with acculturation.[6,27,37,45,89–92,94] Income is sometimes directly associated with diet.[37,91,95] Among a sample of African American and Hispanic seventh graders, Frenn et al.[107] found that consumption of low fat diets tended to increase as family income increased. Guendelman and Abrams[91] found that first generation Mexican American women had healthier diets than their second generation counterparts despite having lower income and education. Among first generation women, lower income was positively associated with consuming an adequate diet while no association was found between income and dietary intake for second generation women.[91]

In a study of Chinese American mothers and their children, high household income was related to high maternal intake of fat and sweets but lower obesity risk in children.[37]

Education

Acculturation is positively associated with education in many studies.[6,27,45,89–91] Frequently, more acculturated immigrants are reported to have higher education and higher income than their less acculturated counterparts.[6,45,89–91] In some studies, a direct relationship between education and diet was described.[7,95,108]

Liu et al.[109] reported that among middle-aged Chinese American women with less than a high-school education, more acculturated women consumed a more varied and sufficient diet but showed lower dietary moderation. They found no association between education and diet quality among more educated women.[109] Satia-Abouta et al.[38] found that younger, more educated Chinese American and Chinese Canadian women did not believe that a Chinese diet was healthier than a Western diet and typically preferred a Western diet.

The effects of education on dietary acculturation may be different for Hispanics. Akresh[7] found that more educated Hispanic women exhibited lower levels of dietary change, and suggested that education may result in value being placed on traditional dietary practices.

Age and Gender

Satia-Abouta et al.[3] propose that gender and age are among the factors contributing to immigrants' exposure to their host culture, and thus to dietary acculturation.

Few studies reported differences in acculturation based on age.[38,95,108,110] One study[38] revealed that among Chinese-origin adult women, age was associated with diet-disease awareness, diet beliefs, knowledge of government nutrition materials, perceptions of food cost and availability, and preferences for traditional meals. Franzen and Smith[27] conducted focus groups with adult Hmong immigrants and stated that younger respondents reported consuming less rice, a traditional staple food, as they got older. Herbert et al.[110] reported that fruit and vegetable consumption was higher for younger Vietnamese American adolescents than their older counterparts.

Some studies[7,33,78,111] revealed gender-based differences in dietary acculturation. For example, Dixon et al.[89] revealed some differences between men and women in the associations between nutrient intake and nativity or language spoken at home. Additionally, Akresh[7] suggested that among Hispanics, adult women may be more prone to dietary acculturation than men. Raj et al.[15] found that Asian Indian women have a greater tendency to snack than men. Other studies discussed below found that men tend to prefer traditional diets.

Ethnic Enclaves

Ethnic enclaves are geographic areas where immigrants' culture of origin predominates.[48] Because of higher exposure to the culture of origin and lower exposure to the host culture, acculturation may occur more slowly in these areas.[48] Prado et al.[48] studied Hispanic immigrants in an ethnic enclave (Miami, FL) and found that nativity was associated with adoption of U.S. cultural practices for adolescents.

Frenn et al.[107] found that the lowest income Hispanic students living in neighborhoods with high exposure to Hispanic foods and culture consumed lower fat diets than their peers in a higher income zip code. They also reported higher familial role modeling for diet and physical activity. However, the researchers did not describe the neighborhood as an ethnic enclave.

Weight Status

Weight status can be significantly impacted by acculturation. Generally, acculturation is associated with increased BMI and risk of overweight and obesity. Pérez -Escamilla[12] reported that among nationally representative studies on Hispanics, the majority reported positive associations between acculturation and obesity. Gordon-Larson et al.[90] showed that length generation level was positively associated with overweight for adolescent Puerto Rican and Cuban immigrants. Another study[111] revealed that after controlling for age and several lifestyle and socioeconomic factors, adult Hispanics living in the U.S. fifteen years or longer had nearly four times greater risk of obesity than adult Hispanics living in the U.S. for five years or less. In a study on

children and adolescents aged 10-17 years, within-ethnicity adjusted odds of obesity were higher for second generation Hispanic and Asian immigrants compared to their first generation counterparts.[101] Asian immigrants had lower odds of obesity than non-Hispanic white children while Hispanic immigrants had higher odds of obesity.[101] In contrast, Akresh[7] showed that among first generation Hispanic immigrants, lower acculturation was associated with higher BMI. It was suggested that this may be related to the inverse relationship between BMI and education but the positive relationship between education and acculturation.[7] Chen[37] also reported that higher level of acculturation was associated with lower BMI in Chinese American mothers and their 8-10 year old children.

Nutrition Knowledge, Dietary Beliefs, and Health Perceptions

Several studies have examined nutritional beliefs of immigrants. Montoya et al.[112] found that between first and second generation Mexican Americans, nutritional beliefs and dietary self-efficacy differed but relative consumption of healthy and unhealthy foods did not. In this context, self-efficacy refers to having confidence in one's ability to consume a healthy diet.[113] In the study by Montoya et al.,[112] Mexican-born individuals stated that dietary choice was more important to them and expressed higher dietary self-efficacy. For U.S.-born Mexican Americans, high dietary self-efficacy was predicted by lower income and higher education.[112]

Aldrich and Variyam[99] reported that less acculturated Hispanics had the lowest nutrition content knowledge and diet-disease awareness among a sample of Hispanic and

non-Hispanic white adults. The authors speculated that this may have been due to limited ability to read nutrition labels.

A study of elderly Chinese American women revealed that low education and low ability to read English were positively associated with adherence to traditional Chinese food beliefs while length of time in the U.S. was not.[108]

Lv and Cason[95] reported that a greater proportion (44.1%) of foreign-born Chinese American adults rated their post-migration diet as healthier than rated their pre-migration diet healthier (21%). In another study,[94] foreign-born Hmong children and adolescents had more positive self-perceptions of their overall health and diet than did their U.S.-born counterparts.

Satia-Abouta et al.[38] found that more than half of a sample of Chinese American and Chinese Canadian women thought a traditional Chinese diet was healthier than an American diet. The majority of study participants believed that a low fat, high fruit and vegetable diet was central to good health.[38] The study also revealed that belief in an association between diet and disease as well as awareness of government nutrition information were significantly associated with adoption of a Western diet.[38] Only one quarter of the sample was aware of government nutrition information, possibly due to language barriers.[38]

In one qualitative study[87] of low income, low acculturated Hispanic mothers of young children, participants consistently cited fruits and vegetables, grains, fish, low sugar intake, and balanced meals as important factors in consuming a healthy diet. Participants also expressed interest in learning more about portion control, nutrition

labeling, and improving children's healthy eating.[87] Interviews with Mexican American mothers of 10-13 year old children revealed some positive aspects of dietary acculturation; some mothers reported consuming more fruits and vegetables since moving to the U.S., using less lard, and trying lower fat cooking methods.[27] They cited advertisements for the health benefits of fruits and vegetables as a reason for increasing their intake.[27]

Meal Patterns

Romero-Gwynn and Gwynn[43] examined meal pattern changes for first and second generation Mexican Americans, and found that meal patterns changed from the traditional Mexican meal pattern for second generation immigrants. They reported that most second generation immigrants consumed their heaviest meal in the evening versus in the afternoon.

Several studies showed differences between immigrant generations in the number of meals consumed per day. In a study by Gordon-Larson et al.,[90] foreign-born Hispanic adolescents ate breakfast more frequently than native-born Hispanic adolescents. Among Mexican Americans, first generation adolescents consumed lunch significantly more frequently and dinner significantly less frequently than their second generation counterparts.[90]

In a study of recently immigrated Asian college students,[114] 46% reported skipping breakfast regularly due to their school schedules. Lv and Cason[95] reported that, since immigration, an equal number of Chinese American adults (20%) reported

increasing the number of meals consumed daily as reported decreasing the number of meals consumed daily. Sixty-five percent of the respondents reported skipping breakfast regularly.[95] In another study,[93] third generation Japanese American women reported eating fewer meals per day on average than their second generation mothers.

Breakfast and lunch were shown to be more heavily acculturated in one study on Asian and Hispanic preadolescents and two additional studies on Asian families.[23,26,47] In a study on Hmong children and adolescents, first generation participants reported that snack and dessert consumption were new additions to their daily meal patterns.[94]

Traditional Foods

Several studies discussed the effects of acculturation on consumption of traditional foods. Despite reporting changing consumption trends, few studies clearly indicated that a change of preference toward American foods occurred with acculturation for adults. Changing consumption patterns reported in the literature may reflect shifting preferences but may also be due to lifestyle changes, food availability, quality and taste of traditional foods, and other factors.

Several studies[25,26,27,62] indicated that children often have a preference for American foods and consume them with greater frequency than their parents. A study on South Asian and Arabic immigrants to Canada reported that traditional foods were especially important to parents, but that children frequently rejected them due to increased preference for Western foods.[63] Children's rejection of traditional foods was viewed by parents as a rejection of their native culture and associated perspectives.[63]

Parents in this study reported sometimes accommodating their children's requests for Western foods by modifying them to reflect their traditional cuisine. For example, pizza was prepared with Indian sauces, spices, and toppings.[63] Some Asian and Hispanic parents similarly reported adopting some American entrées as a means of compromise with children's preferences for American foods.[25,27] Lv and Brown[26] reported that Chinese American parents tended to choose foods similar to Chinese foods, such as pasta. For Asian parents, other ways of dealing with children's preferences for American foods included serving them fast food or convenience foods (e.g. macaroni and cheese or pizza) while consuming a traditional meal themselves.[26,27]

Low acculturated Mexican American mothers in one study[27] reported that they preferred to cook traditional meals despite longer preparation time compared with American meals. Cooking traditional meals was considered an important part of passing on their ethnic identities to their children. Several other studies[27,38,87,95] addressed the increased preparation time associated with traditional meals, and this was frequently reported to be a barrier to their consumption. A study[87] on low acculturated, low income Mexican American mothers revealed that they preferred to cook traditional meals but sometimes relied on convenience foods due to time constraints. They were aware that convenience foods were of lower nutritional quality and tried to limit their children's consumption of them. Lv and Cason[95] reported that first generation Chinese Americans decreased consumption of traditional meals due to having insufficient time to prepare them. Similarly, Satia-Abouta et al.[38] found that many working Chinese American

women found that traditional foods were inconvenient to prepare.[38] Younger, more educated women in this sample tended to prefer an American diet.[38]

Three studies[28,74,95] noted that consumption of traditional foods by immigrants was affected by negative differences in their quality and taste compared with their countries of origin. Differences primarily involved amount of processing and decreased freshness.[28,74]

Immigrants may embrace some American foods but also retain preferences for their traditional foods.[3] This is particularly evident for special occasions. For example, Pan et al.[114] reported that recently migrated Asian college students tended to consume traditional foods on special occasions important to their native cultures, but approximately one quarter also consumed American foods on holidays such as Thanksgiving and Christmas. A study of first generation Korean American mothers showed that special occasion foods were similar to those preferred by their native Korean peers, while preference for some other Korean foods declined with acculturation.[45] Bush et al.[115] found that despite being born in the U.K., South Asian women still had strong ties to their culture of origin traditions and placed greater importance on traditional meals as key components of hospitality than did the mainstream British culture.

Raj et al.[15] reported that the majority of a sample of Asian Indians preferred a traditional diet, and found an increase in traditional meals with length of time in the U.S. They reported that Asian Indian immigrants who had lived in the U.S. for more than ten years ate Indian foods for dinner on weekends and weekdays more often than recent immigrants.[15]

Two studies indicated that adult males of Chinese origin were particularly preferential to traditional meals.[26,38] Satia et al.[38] reported that older Chinese-origin relatives living with their families preferred traditional meals and tended to heavily influence the household's eating pattern, a finding which they noted is reflective of traditional Chinese culture.[38]

Food Insecurity

Food insecurity is frequently associated with poor health outcomes and remains a widespread problem among Hispanics in the U.S.[116] Gorman et al.[16] found that more acculturated Hispanics had lower rates of food insecurity than less acculturated Hispanics. However, Pérez-Escamilla[116] reported that the association between food insecurity and acculturation is inconsistent in studies on Hispanics. Migration to the U.S. from countries where food insecurity is prevalent may have negative effects on some Hispanic immigrants. Dodson et al.[74] reported that some Hispanic immigrants viewed their diets in their native countries as healthier because they did not have money to buy extra, unhealthy foods.

Food insecurity in their country of origin may also play a role in consumption patterns of some Asian immigrants.[27] A number of Asian countries have experienced high rates of food insecurity in recent years.[117] As reported by Franzen and Smith[27] in a study on Hmong adults, these immigrants may overcompensate when faced with an abundance of new foods, consuming less healthy foods instead of or in addition to their traditional diets. For some, government assistance with food spending may encourage

this trend.[27] Another potential consequence of past food insecurity is the tendency to overfeed children.[27] Franzen and Smith[27] explained that some immigrant refugees coming from refugee camps or countries at war often have a cultural preference for overweight children due to their higher likelihood of survival in times of food deprivation. This continued preference and resulting child-feeding behaviors can put children and adults at higher risk of overweight and obesity and related chronic diseases.[27]

Factors Affecting Food Choice

The studies described above illustrate the influence of cost, convenience, adult relatives' and children's preferences, cultural traditions, knowledge, and beliefs on food choice. These and other factors affecting food choice were also described in other studies. Low income, low acculturated Hispanic mothers revealed that major factors affecting food choice were convenience, cost, preferences for a traditional Mexican diet, children's preferences, familiarity with foods, and knowledge of how to prepare foods.[87] These findings were supported by another study on Mexican American women.[27] A study of Hispanic immigrants in Mississippi found that work and time constraints were the main factors affecting food choices, followed by cost and availability.[74] Lv and Cason[95] reported that the main factors affecting food choice among a sample of Chinese Americans were convenience and availability.

Meals Away From Home

In general, frequency of meals away from home increases with acculturation. Two studies[45,118] found that Korean American immigrants eat away from home more than their native Korean peers. Acculturation was associated with increased meals away from home for Japanese American[93] and Korean American women.[45] Two studies noted the tendency of parents to purchase fast food for their children in an effort to placate their demands for American foods.[26,27]

Ayala et al.[33] studied the nutritional impact on Hispanic immigrants of eating away from home at restaurants and fast food establishments as well as relatives', neighbors' or friends' homes ("RNF eating"). According to the authors, RNF eating is particularly common among the Hispanic immigrant community and often involves an abundance of fat- and energy-dense foods.[33] They found that consumption of meals away from home increased with acculturation, and that away from home eating, including RNF eating, was associated with increased risk of overweight in children.

In addition to the studies described above, greater consumption of fast food with acculturation was further reported in two studies on Asians[44,118] and two on Hispanics.[44,90] One study found a decrease in meals away from home compared to pre-migration behaviors; Pan et al.[114] reported that recently migrated Asian college students consumed fast food less frequently in the U.S., possibly due to having lower income than in their native countries.

A study of South Asian and Arabic immigrants to Canada[63] revealed that eating away from home, including allowing children to purchase school lunch and fast food, was problematic because of the risk of consuming religiously forbidden foods. Mothers reported rarely eating away from home or allowing their children to do so.

Foods & Beverages

Many changes in food and beverage consumption were reported to be associated with acculturation and migration. Overall, there appears to be a trend toward decreased diet quality.

Several studies showed increases in consumption of common American entrée foods and convenience foods.[43,47,74,95,103,105] Increased intake of sweets and/or salty snacks was reported for Asians in four studies[15,93,95,104] and Hispanics in two studies.[89,98] Breakfast cereal intake was shown to increase upon immigration for Hispanics but consumption was similar between low and high acculturated individuals.[43] Asian immigrants consumed more breakfast cereal with acculturation.[47,93,104] Increased soda or sugar-sweetened beverage consumption was reported in four studies on Hispanic immigrants[12,13,43,106] and five on Asian immigrants.[13,15,47,93,104]

Six studies[12,13,89,90,96,100] on Hispanic immigrants found a decrease in fruit and vegetable intake with acculturation, with one study reporting conflicting results.[43] Fruit juice consumption similarly showed a decline with acculturation.[89,96,105] The effects of fruit and vegetable consumption with acculturation were inconsistent for Asian immigrants.[45,95,110] Two studies showed decreased milk consumption with acculturation

for Hispanic adolescents[13,90] while two studies[13,110] showed that milk consumption increased with acculturation or migration for Asian adolescents.

Total fat was shown to increase in one study on Korean Americans[45] while saturated fat was reported to decrease for Asian Indians.[15] For Hispanic immigrants, consumption of dietary fat was reported to increase with acculturation in five studies[12,96,100,102,103] and to decrease in one study.[90]

Consumption of traditional staple foods may decline more for Hispanic immigrants than for Asian immigrants with acculturation. Beans and rice are traditional staple foods in many Hispanic cultures.[119] Decreased consumption of beans and legumes was reported in four studies[89,90,98,105] on Hispanic immigrants and rice consumption decreased in two studies.[90,98] In contrast, Satia-Abouta et al.[3] reported that consumption of rice, also a traditional staple food in many Asian cultures, remains high among Asian immigrants. Another study[93] on Japanese American women showed some decline from the second to the third generation but rice remained a staple food. Other studies similarly showed that rice remained an important component of the diet,[15,37,94,104] while one study[95] on Chinese Americans showed that its consumption declined significantly after immigration. Kudo et al.[93] noted that Japanese accessory foods were more quickly replaced in the food hierarchy following immigration.

Concluding Remarks on Related Research

The above studies illustrate that acculturation is frequently associated with dietary change and that children often adapt more quickly to a mainstream American diet than do

their parents. The question remains whether children adapt, or possibly fail to adapt, to such a degree that their diets do not differ regardless of their parents' acculturation level. The studies above also demonstrated that health and nutrition beliefs sometimes differ between individuals of the same ethnic/racial group based on acculturation level; these beliefs may impact parent child-feeding behaviors that in turn affect children's consumption and lifetime eating patterns and habits. Lifestyle changes also frequently occur with immigration and subsequent acculturation that could possibly impact family meals and eating away from home. The objective of the current study is to examine whether differences exist in these areas between families whose primary food-providing parents are of the same racial/ethnic identity but different acculturation levels. Findings may be used to generate future research and to identify potential areas for nutrition intervention.

Methods

Research questions were addressed by analyzing survey data from preadolescent children and their Asian or Hispanic parents[iii].

Surveys

Survey data used in the current study was collected as part of an on-going United States Department of Agriculture (USDA) Agricultural Experiment Station Mulit-State Project examining motivators and barriers to calcium intake among parents and their preadolescent children. The National Osteoporosis Risk Assessment found that Asian, Hispanic, and non-Hispanic white individuals had the highest risk of osteoporosis development.[120] Risk of osteoporosis development can be minimized by consuming adequate amounts of calcium during preadolescence.[121] Based on this information, the USDA project targeted Asian, Hispanic, and non-Hispanic white parents and their preadolescent children to determine household and parenting factors associated with calcium intake. A food frequency questionnaire was developed and validated among Asian, Hispanic, and non-Hispanic white youth to estimate calcium intake.[122] Information from interviews and surveys from the USDA project will be used to develop messages aimed at promoting calcium intake in these groups.

[iii] In nine cases, the primary food provider taking the survey was not the child's parent but a grandparent, aunt/uncle, sibling or other relation. For simplicity, however, all caregivers will be referred to as parents throughout this thesis.

Data were collected in the following 11 states: Arizona, California, Colorado, Hawaii, Indiana, Kentucky, Michigan, Minnesota, Oregon, Utah, and Washington. Research Institutions in all eleven states received approval for the study by their respective Institutional Review Boards. Parents involved in the survey were required to be the primary food provider for their households, self-identify as Asian or Asian American, Hispanic or Latino, or non-Hispanic white, and have a preadolescent child. In addition, they were required to have resided in the U.S. for at least one year and to be able to read and speak English. In some cases, however, parents' English reading skills were limited and they were assisted by their children.

A cross-sectional design and purposive sampling were used to recruit parent-child pairs between April 2006 and September 2008. Parents and children were recruited by a variety of methods, including leaflets, presentations, verbal announcements, personal networking, and advertisements in newsletters. All states except Indiana and Kentucky recruited numbers of Asian, Hispanic, and non-Hispanic white parents approximately proportionate to their demographic profiles. A number of groups and associations were targeted for recruitment in order to vary the socioeconomic status of the sample. These included after-school programs, faith-based groups, scouting groups, sports teams, the Expanded Food and Nutrition Education Program, Supplemental Nutrition Assistance Program Education, and the Special Supplemental Nutrition Program for Women, Infants, and Children.

Both surveys included food frequency questions with serving sizes. Parent surveys included questions regarding availability, role modeling, rules, knowledge, and beliefs pertaining to food and nutrition with an emphasis on calcium-rich foods. Other parent questions addressed the frequency and nature of family meals and meals away from home. Besides food frequency questions, child surveys included questions pertaining to availability, beliefs, influences, eating patterns, food sources, role modeling, eating locations, and food preparation. Questions concentrated especially on calcium-rich foods.

Demographic information available from the child surveys included age, grade level, gender, ethnic/racial self-identification, and relation to children and adults living in the home. No information on household income was provided. Parent surveys included relation to the child taking the child survey, state of residence, age range, gender, generation level, language spoken at home, education level, years in the U.S., ethnic/racial self-identification of the respondent and spouse/partner, employment status of the respondent and spouse/partner, number and relation to other adults in the home, number of children in the home, and participation in nutrition assistance programs. Nutrition assistance programs listed were the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC), the Supplemental Nutrition Assistance Program (SNAP, referred to as food stamps in the survey), and the free and reduced price lunch program.

Data Collection

Data were collected according to a standardized protocol developed to ensure consistency across all participating states. Surveys were self-administered by parents and their children separately. Sites of data collection included community settings, e.g. community centers, libraries, and respondents' homes. In three states, questionnaires were mailed to 14-50% of recipients with a stamped return envelope. Questionnaires were completed in English and took 20-45 minutes for most parents to complete, and 20-30 minutes for children. Parents received $5-20 in cash or gift certificates based on each research institution's approved remuneration.

Survey Questions Analyzed

For this study, questions analyzed from the parent survey pertained to family meals, meals away from home, and child-feeding behaviors (breakfast consumption, reduced soda intake, consumption of milk with meals and snacks). These questions were chosen based on the initial research questions, questions available in the surveys, and findings from existing literature.

Child survey questions analyzed pertained to consumption of specific foods and beverages and consumption of breakfast. Foods chosen for analysis were foods and beverages common to mainstream American culture that showed significant increases or decreases with acculturation for Asian and/or Hispanic immigrants in previous research. It is important to note that foods chosen for analysis were not all strictly American but

were selected because they are commonly consumed in the U.S. and were referenced in previous studies. In the case of vegetables, broccoli and carrots were chosen because they are commonly consumed in the U.S.[123] whereas other vegetables referenced in the survey are more typical of Asian or Hispanic cultures.[122]

After initial data analysis, some additional survey questions ("supplemental data") were examined to deepen understanding of the findings. These questions primarily pertained to characterization of family meals and meals away from home. These were not analyzed for statistical significance but trends were examined for guiding future research.

Sample Construction

Parent survey data were first filtered for parents who self-identified as only Asian or Hispanic and who had lived in the U.S. for more than ten years. Length of U.S. residence was limited to more than ten years to make certain that all children had grown up in the U.S. Restricting length of residence also ensured that foreign-born parents had experienced U.S. culture to some extent. Within each racial/ethnic group, parents were then assigned to one of two groups based on nativity (FB or NB). These subgroups are hereafter denoted as "parent nativity groups." After filtering the parent data, the child data sets were created by matching the questionnaire numbers of the included parents to those of their corresponding children. Children were then assigned to the appropriate parent nativity group.

Hypothesis Testing[124–127]

All survey questions listed under hypotheses were analyzed according to nativity for each racial/ethnic group. Statistical significance was determined at the 95% confidence level ($p<0.05$). For purposes of interpretation and discussion, groups were occasionally compared by proportions. The majority of the data analysis was performed using IBM SPSS Statistics 19, copyright 2010 by International Business Machines Corp., Armonk, New York. Exact logistic regression was performed using SAS 9.2, copyright 2002-2008 by SAS Institute, Inc., Cary, North Carolina.

Options for food frequency questions ranged from never or less than once per month to 4 or more servings per day. Weekly and daily frequency options varied with the type of food or beverage. Response options for questions pertaining to parent child-feeding behaviors were: never, rarely, some of the time, most of the time, or always. For questions addressing frequency of family meals, response options were: never, 1-2 days, 3-4 days, 5-6 days, and everyday. The question regarding meals away from home gave the following choices: once every 2-3 months, 1-3 times per month, 1-2 times per week, 3-4 times per week, and 5 or more times per week.

Raw data was initially analyzed by the Mann-Whitney U Test and Spearman rank order correlation to determine if there was an association between nativity and the variable across all response options. Because education and employment were significantly correlated with nativity for both groups and may confound the influence of parental acculturation, it was necessary to control for these variables. These variables

were first collapsed into dichotomous variables. Education was dichotomized into low and high categories, with highly educated being defined by having a 4-year degree, advanced degree, or some college or technical school. Similarly, employment was collapsed into part time and full time employment ("employed") versus student, homemaker/househusband, retired, and not employed ("not employed"). The dichotomous employment and education variables were positively correlated with nativity for both Asian and Hispanic groups. Spouse employment was not significantly correlated with nativity and therefore was not controlled for. Initially, an attempt was made to control for employment and education of the samples by conducting ordinal logistic regression. However, sample sizes were too small to allow sufficient cell size and model fit. Survey questions were then dichotomized in order to control by binary logistic regression but this method was also problematic due to model fit. Ultimately, exact logistic regression was performed to obtain adjusted odds ratios and 95% confidence intervals for response variables with respect to parental nativity.

Unadjusted dichotomized data were analyzed by odds ratio and continuity corrected chi-squared test. Fisher's Exact Test was used instead of chi-squared analysis when expected cell counts were <5.

Dichotomization of Survey Questions

Food frequency questions and the question pertaining to meals away from home were collapsed into frequent (≥ one time/week) versus infrequent (< one time/week).

Parent child-feeding questions were collapsed into frequent (most of the time + always) and infrequent (never + rarely + some of the time). Family meal questions were likewise collapsed into categories of 0-4 times per week and 5 or more times per week consistent with other research[29] and evidence that children benefit from family meals consumed four or more times per week.[19] Dichotomizing in this way retained the overall research objectives while allowing for greater precision.

Results

The general demographics of each subgroup are discussed below, followed by differences according to nativity. After demographic information, results of hypothesis testing are presented in stages. First, key differences between raw and dichtomized data are discussed followed by a summary of dichotomized, unadjusted results. Finally, dichotomized results controlled for education and employment are presented. The results of all statistical analyses as well as demographic and supplemental data are presented in table format.

Demographics

Hispanic Group

The demographic variables for both Hispanic and Asian respondents are summarized in Table 1 according to parent nativity. The Hispanic group was created by selecting parent respondents who self-identified as Hispanic or Latino only and had lived in the U.S. for more than ten years. Children[iv] were then matched to their parents by questionnaire number. One parent-child dyad was excluded because the child was 17 years old. The final Hispanic group consisted of n=134 parent and child pairs, with 65 and 69 parent-child dyads in the foreign and native-born groups, respectively. Ninety-five percent of parent respondents were female. The greatest number of respondents (n=48) lived in Arizona. The majority of Hispanic parent respondents (61%) were ages 31-40

[iv] Although some child respondents reported self-identifying as another race or ethnicity in addition to Asian or Hispanic, they will be referred to only as Asian or Hispanic throughout this thesis.

years and the greatest number of parent respondents (n=47) reported having a high school diploma or GED as their highest level of formal education. Sixty percent of parent respondents were employed full-time. The greatest number (n=47) of parent respondents reported having two children at home, and 18% reported having three or more adults in the home, including themselves. Nine percent reported living with a mother or mother-in-law and 4% with a father or father-in-law. Participation in nutrition assistance programs was relatively high for Hispanic respondents, with many reporting participation in free/reduced priced school lunch (41%), food stamps (18%), and/or WIC (9%). The greatest percentage (37%) of parent respondents reported speaking English and another language the same amount of time at home. Eighteen percent reported speaking no English at home. Hispanic child respondents ranged in age from 9-14 years old and the majority were ages 10-13 years and in grades five through eight. Fifty-three percent of Hispanic child respondents were female.

Asian Group

The Asian subset of data was sorted similarly to the Hispanic subset; parent respondents were selected if they self identified only as Asian or Asian American and reported living in the U.S. for ten years or longer. This resulted in a sample size of n=74 parent-child pairs, with 43 and 31 parent-child dyads in the foreign and native-born groups, respectively. The majority (54%) of Asian respondents lived in Hawaii. Most parent respondents were female (86%) age 41-50 years (57%), with 58% having a 4-year

college degree, university degree, or advanced degree. Sixty-two percent of Asian parent respondents were employed full-time. Forty-six percent of parent respondents reported having two children at home and 31% reported having three or more adults in the home, including themselves. In most cases the additional adult(s) were a parent, parent-in-law or adult child of the parent respondent. Eighty one percent of participants reported no participation in nutrition assistance programs. English-speaking at home was more common for the Asian group than for the Hispanic group. Thirty-nine percent of parent respondents reported speaking only English at home. By contrast, twelve percent reported speaking no English at home. Children ranged in age from 9-14 years, with most children being 10-13 years old and in grades five through eight. Fifty-eight percent of Asian child respondents were female.

Demographic Differences by Parental Nativity

Hispanic Group

In the Hispanic group, a greater percentage of NB parents reported living in Arizona (62% NB versus 8% FB) while the FB group was more varied geographically. FB parents reported speaking less English at home than NB parents; speaking English at home was significantly correlated with nativity (Spearman r (r_s)=.52, p=.00). Thirty-seven percent of the FB parents and none of the NB parents reported speaking no English at home. By contrast, 22% of the NB group compared to 2% of the FB group reported speaking only English at home. Because language is another common proxy measure of

acculturation, these data support the assumption that the NB group was more acculturated than the FB group.

Education was significantly correlated with nativity (r_s =.30, p=.00), with the FB group being less educated overall. Seventy-seven percent of the FB parents reported having a high school education or less compared to 49% of the NB group. Nativity was significantly correlated with employment (r_s =.33, p=.00), with more NB parents being employed. Fifty-five percent of the FB group and 89% of the NB group reported having full- or part-time employment. The majority of both groups (66% FB and 75% NB) reported having a spouse or partner who was employed full-time; spouse employment was not significantly correlated with nativity. Nativity was associated with participation in nutrition assistance programs (Chi-squared (X^2)=10.9, p=.00), with more NB parents reporting no participation in nutrition assistance programs. The greater participation in nutrition assistance programs combined with the lower employment and education levels of the FB group indicate that this group was lower income than the NB group. No significant correlations existed between nativity and gender or nativity and age of the responding parent; thus, these variables were not controlled for in the analysis.

Asian Group

Among the Asian subset, education was correlated with nativity, with the FB group being less educated overall than the NB group (r_s =.28, p=.02). The FB group also had fewer respondents reporting part-time or full-time employment (71% FB versus 90%

NB). Nativity was significantly correlated with employment (r_s =.25, p=.03). A greater proportion of NB parents reported no use of nutrition assistance programs (90% NB versus 74% FB). These factors together indicate that the FB group was likely lower income.

A greater percentage of NB parents reported living in Hawaii (77% NB versus 37% FB). The remaining FB parents reported living primarily in California, Michigan, and Washington. More FB parents reported living with extended family. However, living with an older relative (parent) was not significantly correlated with nativity. The FB group was more variable in language spoken at home. Speaking English at home was positively correlated with nativity (r_s =.73, p=.00). Eighty one percent of the NB group and 9% of the FB group reported speaking only English at home. By comparison, 21% of the FB group and none of the NB group reported speaking no English at home. These data support the assumption that the NB group was on the whole more acculturated than the FB group. This finding may be attributable in part to the greater number of NB parents married to non-Asians. Approximately one-fourth of the NB group was married to non-Asians compared 14% of the FB group. A greater percentage of FB parent respondents were male (20% versus 9%). No significant correlations were found between nativity and gender or nativity and age of the responding parent.

Table 1. Demographics of Asian and Hispanic Participants by Parent Nativity				
	Asian		**Hispanic**	
	%[a]FB (n=43)	**%NB (n=31)**	**%FB (n=65)**	**%NB (n=69)**
State				
California	19	10	20	16
Arizona	0	0	8	62
Colorado	2	0	3	1
Hawaii	37	77	3	1
Michigan	26	6	9	9
Minnesota	2	0	2	4
Oregon	2	0	34	1
Washington	12	0	2	1
Utah	0	6	20	3
Age				
18-30 years	5	10	14	9
31-40 years	35	19	57	64
41-50 years	53	61	24	25
51 years and older	7	10	5	3
Gender				
Male	9	20	5	4
Female	91	80	95	96
Highest Level of Formal Education				
Have not completed high school	12	0	49	4
Received high school diploma or GED	12	3	28	45
Some college or technical school	23	32	15	45
4-year college, university degree or advanced degree	53	65	8	6
Employment Status				
Student	0	3	2	0
Homemaker/househusband	24	6	34	10
Not employed	5	0	8	1
Employed part-time	14	19	8	18
Employed full-time	57	71	47	71
Spouse/Partner Employment Status				
I do not have a spouse or partner	7	10	19	17
Student	2	0	0	0
Homemaker/househusband	5	0	5	0
Not employed	2	0	5	3
Employed part-time	5	6	5	4
Employed full-time	77	84	66	75
Retired	2	0	0	0
Spouse/Partner Ethnicity				
No spouse or partner	9	10	14	17
Hispanic or Latino	0	7	78	75
Asian or Asian American	77	65	0	0
American Indian or Alaska Native	0	3	0	0
White or Caucasian	14	23	2	4

Table 1 (Continued). Demographics of Asian and Hispanic Participants by Parent Nativity

	Asian		Hispanic	
	%[a] FB	% NB	% FB	% NB
Number of Children Under the Age of 18 in the Home				
4 or fewer	93	97	92	97
5 or more	7	3	8	3
Number of Adults Living in the Home, Including Respondent				
1	5	6	16	13
2	53	77	60	74
3 or more	42	16	24	13
Adults Living in the Home				
Spouse or Partner	86	90	77	81
Mother or mother-in-law	23	10	5	13
Father or father-in-law	14	6	5	3
Sister(s)/sister(s)-in-law or brother(s)/brother(s)-in-law	12	6	8	1
Grandparent(s) or spouse's grandparent(s)	0	0	0	0
Adult children (18 years or over)	19	6	8	7
Other	5	0	9	3
Participation in Nutrition Assistance Programs				
WIC	9	0	11	7
Food Stamps	9	0	22	14
Free/reduced priced school lunch	19	10	55	28
None	74	90	34	62
Language Spoken at Home				
No English spoken at home	21	0	37	0
Only English spoken at home	9	81	2	22
English and another language spoken about the same amount at home	23	3	25	49
Another language spoken more than English at home	21	0	22	10
More English spoken than another language at home	26	16	14	19
Child Age				
9-10 years	30	21	30	17
11-12 years	42	51	25	59
13-14 years	28	26	47	23
Child Gender				
Male	44	39	42	51
Female	56	61	58	49
Relation of Parent to Child				
Parent	95	94	94	99
Grandparent	0	0	5	1
Aunt or Uncle	2	0	0	0
Sibling	2	3	2	0
Other	0	3	0	0

Abbreviations: FB, foreign-born parent; NB, native-born parent
[a]Valid percentage within parent nativity group

Hypotheses

Overall, hypothesis testing revealed more differences between FB and NB parent groups among Hispanics than among Asians. Results of hypothesis testing prior to adjustment for education and employment are summarized briefly below and reported in tables 2-13. A short comparison of key differences between uncollapsed and collapsed data is made first.

Unadjusted Data

Differences in the distributions of the data were examined by Spearman rank correlation and the Mann Whitney U test prior to dichotomizing variables. In all cases, non-zero correlations were weak to moderate. However, trends observed in the uncollapsed data remained consistent after dichotomizing. Several variables lost statistical significance after dichotomizing. Uncollapsed data were examined to determine where key discrepancies occurred that were masked by dichotomization; these findings are reported below.

For the Hispanic group, several variables were significantly associated with nativity prior to but not after dichotomizing. Among children, consumption of raw broccoli, cooked broccoli, and carrots were negatively correlated with nativity. Eighty four percent of children of NB parents reported eating raw broccoli never or less than once per month, compared to 62% of children of FB parents. Similar findings were found for cooked broccoli and carrots; 57% of children of NB parents compared to 34% of

children of FB parents reported eating cooked broccoli never or less than once per month. For carrots, this percentage was 47% for children of NB parents and 20% for children of FB parents.

Among parent-child feeding behaviors, encouragement of breakfast-eating and milk-drinking at breakfast, dinner, and snacks were statistically significant prior to dichotomization. Seventy two percent of NB parents compared to 55% of FB parents reported always trying to get children to consume breakfast, while more FB parents (28% versus 16% of NB parents) reported doing so most of the time. For milk-drinking, a greater percentage of NB parents reported always trying to encourage this behavior while the percentage of parents reporting never or rarely trying to get children to drink milk was usually higher for FB parents.

Consumption of lunch as a family was significantly negatively correlated with nativity prior to dichotomization. Seventy two percent of NB parents reported eating lunch together only 1-2 days per week compared to 46% of FB parents. By contrast, 20% of FB parents and 6% of NB parents reported always eating lunch together. After dichotomization, this variable fell just short of statistical significance (p=.05).

Unadjusted Dichotomized Data

Unadjusted data were not controlled for education or employment levels of the parent respondent. Summaries of unadjusted data regarding children's eating habits are

presented in tables 2 and 3 for Hispanic and Asian groups, respectively. The Hispanic group showed a trend toward greater consumption of American entrée foods by children of NB parents, with the exception of pancakes, waffles, or French toast. Children of FB parents were more likely to consume vegetables frequently. Dessert foods and beverages did not show consistent trends. Among Asian children, there were no statistically significant differences and correlations were weak to moderate. No consistent trends were observed among entrée foods or vegetables. Children of NB parents were more likely to consume dessert foods, while children of FB parents were more likely to consume milk, juice, and sugar sweetened beverages.

Table 2. Consumption of Select Foods & Beverages by Hispanic Preadolescents – Unadjusted Results

Food or Beverage	X_1^{2c}	P	OR[d]	95% CI	% Frequent[a]		Spearman Rank Order Correlation Uncollapsed Data[b]	
					FB Parents	NB Parents	r_s	P
Hamburger or hot dog without cheese	1.01	.31	1.63	(0.73, 3.63)	20	29	.06	.50
Hamburger or hot dog with cheese	14.20	.00	4.33	(2.05, 9.16)	23	57	.29	.00
Pizza	1.60	.21	1.66	(0.83, 3.30)	48	61	.13	.14
Macaroni and cheese	0.00	1.00	1.01	(0.44, 2.30)	22	22	.07	.41
Cold cereal	2.24	.13	2.18	(0.89, 5.35)	75	87	-.01	.96
Pancakes, waffles, or French toast	5.20	.02	0.34	(0.14, 0.81)	31	13	-.33	.00
Cooked broccoli	0.65	.42	0.66	(0.29, 1.49)	26	19	-.21	.02
Raw broccoli	3.12	.08	0.30	(0.09, 1.00)	17	6	-.25	.00
Carrots	2.81	.09	0.49	(0.23, 1.04)	39	24	-.26	.00
Chocolate bar	4.71	.03	2.32	(1.14, 4.70)	31	51	.14	.10
Ice cream	1.80	.18	0.56	(0.29, 1.17)	48	35	-.16	.07
Cupcakes or cake	3.79	.05	2.97	(1.08, 8.14)	9	23	.04	.61
Milk	0.00	1.00	0.92	(0.33, 2.55)	88	87	-.07	.46
Soda	9.77	.00	3.15	(1.52, 6.56)	49	75	.31	.00
Orange juice	0.03	.86	0.39	(0.19, 0.82)	74	71	-.17	.06
Fruit flavored drinks, e.g. Hawaiian Punch®, lemonade, Kool Aid®	5.37	.02	0.87	(0.41, 1.85)	77	57	-.26	.00

Abbreviations: OR, odds ratio; CI, confidence interval; FB, foreign-born; NB, native-born; FET, Fisher's Exact Test

[a]Frequent is defined as reported intake of once per week or more

[b]Positive correlation indicates increased frequency among the NB group

[c]Continuity corrected

[d]OR defined as odds of frequent consumption by NB parent group relative to FB parent group

Table 3. Consumption of Select Foods & Beverages by Asian Preadolescents – Unadjusted Results

Food or Beverage	X_1^{2c}	P	OR[d]	95% CI	% Frequent[a]		Spearman Rank Order Correlation Uncollapsed Data[b]	
					FB Parents	NB Parents	r_s	P
Hamburger or hot dog without cheese	FET	1.00	1.13	(0.28, 4.59)	12	13	-.15	.20
Hamburger or hot dog with cheese	0.00	1.00	0.84	(0.25, 2.87)	19	16	.02	.87
Pizza	0.00	1.00	1.06	(0.38, 2.94)	28	29	.02	.88
Macaroni and cheese	FET	.75	0.76	(0.20, 2.87)	16	13	-.09	.47
Cold cereal	0.63	.43	1.63	(0.64, 4.15)	40	52	.17	.14
Pancakes, waffles, or French toast	2.50	.11	3.39	(0.92, 12.52)	9	26	.06	.60
Cooked broccoli	0.22	.64	0.67	(0.23, 1.95)	30	23	.01	.94
Raw broccoli	FET	1.00	1.40	(0.08, 23.28)	2	3	-.03	.81
Carrots	0.24	.63	0.69	(0.26, 1.86)	37	29	-.02	.84
Chocolate bar	0.00	1.00	1.10	(0.41, 2.92)	33	36	-.05	.66
Ice cream	0.00	1.00	1.00	(0.39, 2.56)	42	42	.06	.63
Cupcakes or cake	FET	.69	1.39	(0.26, 7.42)	7	10	-.05	.67
Milk	0.00	1.00	0.91	(0.30, 2.77)	79	77	-.11	.36
Soda	0.10	.75	0.76	(0.30, 1.98)	42	36	-.07	.56
Orange juice	3.13	.08	0.38	(0.14, 0.99)	56	32	-.11	.34
Fruit flavored drinks, e.g. Hawaiian Punch®, lemonade, Kool Aid®	0.01	.94	0.86	(0.34, 2.18)	49	45	.04	.73

Abbreviations: OR, odds ratio; CI, confidence interval; FB, foreign-born; NB, native-born; FET, Fisher's Exact Test

[a]Frequent is defined as reported intake of once per week or more

[b]Positive correlation indicates increased frequency among the NB group

[c]Continuity corrected

[d]OR defined as odds of frequent consumption by NB parent group relative to FB parent group

Unadjusted results of parent child-feeding behaviors by Hispanic and Asian parents are shown in tables 4 and 5, respectively. NB Hispanic parents were more likely to report frequently engaging in these child-feeding behaviors than FB parents. However, no consistent trends were shown by the Asian group.

Table 4. Hispanic Parent Child-Feeding Behaviors – Unadjusted Results

					% Frequent[a]		Spearman Rank Order Correlation Uncollapsed Data[b]	
Child-Feeding Behavior	**X_1^{2c}**	**P**	**OR[d]**	**95% CI**	**FB Parents**	**NB Parents**	**r_s**	**P**
Try to get child to eat breakfast	0.41	.53	1.55	(0.58, 4.15)	83	88	.18	.04
Try to get child to drink milk at breakfast	1.38	.24	1.70	(0.79, 3.62)	66	77	.18	.04
Try to get child to drink milk at snacks	3.43	.06	2.20	(1.02, 4.74)	22	38	.24	.01
Try to get child to drink milk at lunch	13.02	.00	4.09	(1.94, 8.62)	23	55	.28	.00
Try to get child to drink milk at dinner	1.39	.24	1.77	(0.78, 4.00)	19	29	.19	.03
Try to get child to drink less soda	2.44	.12	1.92	(0.92, 3.99)	57	72	.16	.07

Abbreviations: OR, odds ratio; CI, confidence interval; FB, foreign-born; NB, native-born; FET, Fisher's Exact Test

[a]Frequent is defined as parent responses of "most of the time" or "always."

[b]Positive correlation indicates increased frequency among the NB group

[c]Continuity corrected

[d]OR defined as odds of frequent consumption by NB parent group relative to FB parent group.

Table 5. Asian Parent Child-Feeding Behaviors – Unadjusted Results

Child-Feeding Behavior	X_1^{2c}	P	OR[d]	95% CI	% Frequent[a]		Spearman Rank Order Correlation Uncollapsed Data[b]	
					FB Parents	NB Parents	r_s	P
Try to get child to eat breakfast	FET	1.00	0.96	(0.20, 4.62)	91	90	.10	.40
Try to get child to drink milk at breakfast	0.00	1.00	0.97	(0.37, 2.56)	65	65	.09	.43
Try to get child to drink milk at snacks	FET	1.00	1.19	(0.33, 4.30)	14	16	.01	.93
Try to get child to drink milk at lunch	1.25	.26	1.92	(0.75, 4.94)	36	52	.11	.36
Try to get child to drink milk at dinner	0.69	.41	1.80	(0.63, 5.15)	21	32	.17	.15
Try to get child to drink less soda	0.05	.82	1.25	(0.49, 3.21)	56	61	.02	.89

Abbreviations: OR, odds ratio; CI, confidence interval; FB, foreign-born; NB, native-born; FET, Fisher's Exact Test

[a]Frequent is defined as parent responses of "most of the time" or "always."

[b]Positive correlation indicates increased frequency among the NB group

[c]Continuity corrected

[d]OR defined as odds of frequent consumption by NB parent group relative to FB parent group.

Summaries of unadjusted data for family meals are shown in tables 6 and 7 for Hispanic and Asian groups, respectively. Among Hispanic parents, eating lunch together as a family was more likely to occur frequently among FB parent families. By contrast, NB parents had greater odds of consuming breakfast and dinner together as a family. For the Asian group, frequencies of eating breakfast and dinner together were approximately equal between parent nativity groups.

Table 6. Hispanic Group Family Meals – Unadjusted Results

Meal	X_1^{2c}	P	OR[d]	95% CI	% Frequent[a]		Spearman Rank Order Correlation of Uncollapsed Data[b]	
					FB Parents	NB Parents	r_s	P
Breakfast	0.11	.74	1.20	(0.60, 2.43)	35	40	.06	.48
Lunch	3.82	.05	0.35	(0.13, 0.92)	25	10	-.20	.02
Dinner	3.82	.05	2.85	(1.09, 7.47)	75	90	.05	.58

Abbreviations: OR, odds ratio; CI, confidence interval; FB, foreign-born; NB, native-born; FET, Fisher's Exact Test

[a]Frequent is defined as 5 or more times per week.

[b]Positive correlation indicates increased frequency among the NB group

[c]Continuity corrected

[d]OR defined as odds of frequent consumption by NB parent group relative to FB parent group.

Table 7. Asian Group Family Meals – Unadjusted Results

Meal	X_1^{2c}	P	OR[d]	95% CI	% Frequent[a]		Spearman Rank Order Correlation of Uncollapsed Data[b]	
					FB Parents	NB Parents	r_s	P
Breakfast	0.00	1.00	0.94	(0.34, 2.60)	30	29	.05	.70
Lunch	0.00	.99	0.67	(0.12, 3.92)	9	7	.00	.97
Dinner	0.00	1.00	0.99	(0.34, 2.84)	74	74	.06	.64

Abbreviations: OR, odds ratio; CI, confidence interval; FB, foreign-born; NB, native-born; FET, Fisher's Exact Test

[a]Frequent is defined as 5 or more times per week.

[b]Positive correlation indicates increased frequency among the NB group

[c]Continuity corrected

[d]OR defined as odds of frequent consumption by NB parent group relative to FB parent group.

Consumption of meals away from home is summarized in table 8 for both Hispanic and Asian groups. Among Hispanics, the parent nativity groups had nearly equal odds of frequently consuming meals away from home. By contrast, NB Asian parents were more likely to report frequent consumption of meals away from home than FB Asian parents.

Table 8. Consumption of Meals Away From Home by Asian and Hispanic Families – Unadjusted Results

					% Frequent[a]		Spearman Rank Order Correlation of Uncollapsed Data[b]	
	X_1^{2c}	P	OR[d]	95% CI	FB Parents	NB Parents	r_s	P
Hispanic	1.01	.31	1.56	(0.75, 3.25)	37	48	.07	.44
Asian	3.87	.05	3.00	(1.12, 8.06)	40	67	.18	.13

Abbreviations: OR, odds ratio; CI, confidence interval; FB, foreign-born; NB, native-born; FET, Fisher's Exact Test

[a]Frequent is defined as reported intake of once per week or more.

[b]Positive correlation indicates increased frequency among the NB group

[c]Continuity corrected

[d]OR defined as odds of frequent consumption by NB parent group relative to FB parent group.

Unadjusted data for consumption of breakfast by both Hispanic and Asian children is shown in table 9. Relatively few children reported skipping breakfast. In both Hispanic and Asian groups, a greater proportion of children of NB parents reported skipping breakfast.

Table 9. Breakfast Skipping by Asian and Hispanic Preadolescents – Unadjusted Results

					% Skip Breakfast	
	X_1^{2b}	P	OR[c]	95% CI	FB Parents	NB Parents
Asian	FET	.42	-	-	0	3
Hispanic	0.28	.60	1.72	(0.48, 6.18)	6	10

Abbreviations: OR, odds ratio; CI, confidence interval; FB, foreign-born; NB, native-born; FET, Fisher's Exact Test

[a]Positive correlation indicates increased frequency among the NB group

[b]Continuity corrected

[c]OR defined as odds of frequent consumption by NB parent group relative to FB parent group.

Adjusted Data: Hispanic Group

Adjusted odds ratios summarizing Hispanic children's eating patterns and habits are shown in tables 10 and 11. Children of NB parents had greater odds of consuming entrée foods, particularly hamburgers or hot dogs with cheese (OR 6.14, p=.00), cold cereal (OR 2.35, p=.19), and macaroni and cheese (OR 2.10, p=.27). An exception was consumption of pancakes, waffles or French toast, which were more likely to be consumed frequently by children of FB parents (OR 0.22, p=.01). Children of FB parents also had consistently greater odds of frequent vegetable intake. In general, dessert consumption was more frequent among children of NB parents; they had significantly greater odds of consuming chocolate bars (OR 2.87, p=.02) and cupcakes or cake (OR 8.67, p=.00) frequently. Children of NB parents were also significantly more likely to consume soda frequently (OR 5.11, p=.00), while children of FB parents had greater odds

of consuming fruit flavored drinks once per week or more (OR 0.59, p=.30). As shown in table 11, odds of skipping breakfast were greater for children of NB parents (OR 1.52, p=.83).

Table 10. Consumption of Select Foods & Beverages by Hispanic Preadolescents – Results Controlled for Parent Education & Employment

Food or Beverage	**OR[a]**	**95% CI**	**P**
Hamburger or hot dog without cheese	2.29	(0.80, 7.17)	.14
Hamburger or hot dog with cheese	6.14	(2.25, 18.37)	.00
Pizza	1.72	(0.71, 4.23)	.26
Macaroni and cheese	2.10	(0.64, 7.67)	.27
Cold cereal	2.35	(0.71, 8.19)	.19
Pancakes, waffles, or French toast	0.22	(0.07, 0.67)	.01
Cooked broccoli	0.52	(0.18, 1.47)	.25
Raw broccoli	0.13	(0.02, 0.61)	.01
Carrots	0.49	(0.19, 1.26)	.15
Chocolate bar	2.87	(1.16, 7.48)	.02
Ice cream	0.64	(0.26, 1.55)	.37
Cupcakes or cake	8.67	(1.85, 58.65)	.00
Milk	0.99	(0.26, 3.61)	1.00
Soda	5.11	(1.97, 14.17)	.00
Orange juice	0.93	(0.35, 2.44)	1.00
Fruit flavored drinks, e.g. Hawaiian Punch®, lemonade, Kool Aid®	0.59	(0.23, 1.48)	.30

Abbreviations: OR, odds ratio; CI, confidence interval

[a]OR defined as odds of frequent consumption by NB parent group relative to FB parent group; frequent is defined as consumption once per week or more

Table 11. Breakfast Skipping by Asian and Hispanic Preadolescents – Results Controlled for Parent Education & Employment

	OR[a]	95% CI	P
Hispanic	1.52	(.31, 9.09)	.83
Asian	0.96	(.03, ∞)	1.00

Abbreviations: OR, odds ratio; CI, confidence interval
[a]OR defined as odds of skipping breakfast by NB parent group relative to FB parent group

Odds ratios adjusted for education and employment are shown in table 12 for Hispanic parent child-feeding behaviors, family meals, and meals away from home. NB parents were more likely to engage in all child-feeding behaviors examined. In particular, NB parents had significantly greater odds of trying to get children to consume milk at lunch (OR 5.81, p=.00). Families with NB parents were also more likely to eat breakfast (OR 1.89, p=.20) and dinner (OR 5.13, p=.00) together five or more days per week. By contrast, FB parent families had greater odds of eating lunch together frequently (OR 0.76, p=.89). Consumption of meals away from home was slightly more frequent among NB parent families (OR 1.21, p=.84).

Table 12. Frequency of Parent Child-Feeding Behaviors and Family Meals Among Hispanic Parents – Results Controlled for Parent Education & Employment

Parent or Meal Behavior	OR[a]	95% CI	P
Try to get child to eat breakfast	1.74	(0.45, 3.28)	.84
Try to get child to drink milk at breakfast	2.60	(1.00, 7.02)	.05
Try to get child to drink milk at snacks	2.19	(0.83, 6.12)	.12
Try to get child to drink milk at lunch	5.81	(2.16, 17.22)	.00
Try to get child to drink milk at dinner	2.14	(0.72, 6.85)	.20
Try to get child to drink less soda	1.60	(0.64, 4.01)	.37
Eat breakfast together	1.89	(0.75, 4.99)	.20
Eat lunch together	0.76	(0.18, 3.18)	.89
Eat dinner together	5.13	(1.56, 19.10)	.00
Eat meals away from home	1.21	(0.45, 3.28)	.84

Abbreviations: OR, odds ratio; CI, confidence interval

[a]OR defined as odds of frequent occurrence by NB parent group relative to FB parent group; frequent defined as "most of the time" or "always" for parent child-feeding behaviors, once per week or more for meals away from home, and 5 or more times per week for family meals

Adjusted Data: Asian Group

Table 13 shows a summary of Asian children's eating habits and patterns after controlling for parental education and employment. Table 11 above shows odds of skpping breakfast. There were no significant associations between children's intake and nativity. Additionally, the wide confidence intervals provided for some data (hamburgers

or hot dogs with cheese; pancakes, waffles or French toast; cupcakes or cake; raw broccoli; skipping breakfast) indicate a wide margin of error in these estimations. However, some trends were revealed. Children of NB parents were more likely to report frequent consumption of entrée foods, particularly hamburgers or hot dogs with cheese (OR 2.58, p=.51), pancakes, waffles, or French toast (OR 4.29, p=.09), and cold cereal (OR 2.23, p=.19). By contrast, children of FB parents had greater odds of consuming vegetables (carrots and broccoli) frequently. Consumption of beverages was relatively equal between the two groups, with the exception ofich was more likely to be consumed by children of FB parents (OR 0.38, p=.09). Consumption of sweets did not show a consistent trend. Only one child (of NB parents) reported skipping breakfast.

Table 13. Consumption of Select Foods & Beverages by Asian Preadolescents – Results Controlled for Parent Education & Employment

Food or Beverage	OR[a]	95% CI	P
Hamburger or hot dog without cheese	2.58	(0.34, 30.93)	.51
Hamburger or hot dog with cheese	1.01	(0.21, 4.91)	1.00
Pizza	1.15	(0.34, 3.93)	.51
Macaroni and cheese	1.03	(0.18, 5.66)	1.00
Cold cereal	2.23	(0.73, 7.16)	.19
Pancakes, waffles, or French toast	4.29	(0.85, 30.40)	.09
Cooked broccoli	0.70	(0.19, 2.43)	.73
Raw broccoli	0.96	(0.01, 78.46)	1.00
Carrots	0.54	(0.36, 8.02)	.75
Chocolate bar	1.20	(0.38, 3.88)	.93
Ice cream	0.79	(0.25, 2.39)	.83
Cupcakes or cake	3.38	(0.28, 66.79)	.50
Milk	1.11	(.30, 4.22)	1.00
Soda	0.93	(0.30, 2.86)	1.00
Orange juice	0.38	(0.12, 1.13)	.09
Fruit flavored drinks, e.g. Hawaiian Punch®, lemonade, Kool Aid®	0.92	(0.31, 2.72)	1.00

Abbreviations: OR, odds ratio; CI, confidence interval
[a]OR defined as odds of frequent consumption by NB parent group relative to FB parent group

Table 14 shows the odds ratios of parent child-feeding behaviors, family meals, and meals away from home after adjusting for education and employment. NB parents were more likely to encourage milk-drinking at lunch (OR=1.67, p=.44) and dinner (OR=1.51, p=.63) while other parent child-feeding behaviors were relatively equal between parent nativity groups. Consumption of family meals was also similar between

groups, with FB parent families having slightly greater odds of consuming lunch (p=0.8, p=1.00) and dinner (p=0.85,p=1.00) frequently. NB parents were more likely to report consuming meals away from home at least once per week (OR=2.31, p=.17).

Table 14. Frequency of Parent Child-Feeding Behaviors and Family Meals Among Asian Parents – Results Controlled for Parent Education & Employment

Parent or Meal Behavior	**OR[a]**	**95% CI**	**P**
Try to get child to eat breakfast	1.10	(0.16, 8.37)	1.00
Try to get child to drink milk at breakfast	1.08	(0.35, 3.36)	1.00
Try to get child to drink milk at snacks	1.17	(0.24, 5.68)	1.00
Try to get child to drink milk at lunch	1.67	(0.55, 5.15)	.44
Try to get child to drink milk at dinner	1.51	(0.44, 5.29)	.63
Try to get child to drink less soda	1.02	(0.34, 3.10)	1.00
Eat breakfast together	0.99	(0.30, 3.27)	1.00
Eat lunch together	0.81	(0.06, 7.95)	1.00
Eat dinner together	0.85	(0.24, 3.08)	1.00
Eat meals away from home	2.31	(0.75, 7.41)	.17

Abbreviations: OR, odds ratio; CI, confidence interval

[a]OR defined as odds of frequent occurrence by NB parent group relative to FB parent group; frequent defined as "most of the time" or "always" for parent child-feeding behaviors, once per week or more for meals away from home, and 5 or more times per week for family meals

Supplemental Data

Survey questions characterizing family meals and meals away from home were examined for the purpose of enhancing understanding of the general research questions. Because they were not directly stated as hypotheses, these data were not analyzed for statistical significance. Supplemental data are reviewed in the discussion section and are summarized in tables 15-18.

Table 15. Supplemental Data: Hispanic Family Descriptions of Family Meals

Meal	Nativity	Valid %				
		Never	**Rarely**	**Some of the time**	**Most of the time**	**Always**
Dinner is our time to be together and talk	FB	3	8	29	29	31
	NB	0	4	29	49	18
At dinner, everyone is going in different directions, grabbing and running to eat on their own	FB	37	25	25	10	3
	NB	31	46	21	3	0
Our family schedules are too busy for us to eat together	FB	38	32	19	10	2
	NB	37	46	15	3	0
Our family eats meals together in front of the TV	FB	37	19	33	6	5
	NB	12	40	41	4	3

Abbreviations: FB, foreign-born; NB, native-born

Table 16. Supplemental Data: Asian Family Descriptions of Family Meals

Meal	Nativity	Valid %				
		Never	Rarely	Some of the time	Most of the time	Always
Dinner is our time to be together and talk	FB	7	7	16	33	37
	NB	3	0	32	39	26
At dinner, everyone is going in different directions, grabbing and running to eat on their own	FB	37	33	14	12	5
	NB	23	26	48	3	2
Our family schedules are too busy for us to eat together	FB	35	28	23	12	2
	NB	16	36	42	7	0
Our family eats meals together in front of the TV	FB	12	26	30	19	14
	NB	26	19	39	16	0

Abbreviations: FB, foreign-born; NB, native-born

Table 17. Supplemental Data: Hispanic Family Reasons for Eating Meals Away From Home

Meal	Nativity	Valid %				
		Never	Rarely	Some of the time	Most of the time	Always
We are too busy to cook	FB	23	25	26	17	9
	NB	22	26	33	15	4
We are too tired to cook	FB	26	29	23	19	3
	NB	30	23	29	13	4
We are taking children to activities at mealtime	FB	34	27	23	11	5
	NB	19	39	36	4	1
To spend quality time together as a family	FB	6	17	39	23	14
	NB	31	31	22	9	7
To celebrate (wedding, birthday) or as a reward (e.g. for good behavior)	FB	6	12	39	26	17
	NB	4	4	41	41	9
To be with friends in a social gathering	FB	9	26	39	17	9
	NB	3	6	41	46	4
To try something new or different	FB	23	17	39	17	5
	NB	44	25	26	4	1

Abbreviations: FB, foreign-born; NB, native-born

Table 18. Supplemental Data: Asian Family Reasons for Eating Meals Away From Home

Meal	Nativity	Valid %				
		Never	Rarely	Some of the time	Most of the time	Always
We are too busy to cook	FB	9	23	33	28	7
	NB	7	13	39	39	3
We are too tired to cook	FB	16	9	44	26	5
	NB	7	26	48	19	0
We are taking children to activities at mealtime	FB	19	28	40	9	5
	NB	0	26	65	10	0
To spend quality time together as a family	FB	16	9	40	21	14
	NB	3	26	45	16	10
To celebrate (wedding, birthday) or as a reward (e.g. for good behavior)	FB	7	14	28	26	26
	NB	0	13	65	19	3
To be with friends in a social gathering	FB	14	26	33	16	12
	NB	0	16	68	13	2
To try something new or different	FB	7	26	47	14	7
	NB	7	29	58	7	0

Abbreviations: FB, foreign-born; NB, native-born

Discussion

Adjusted results are discussed below in relation to general research questions and select findings along with applications to nutrition intervention and future research. The results from the Hispanic and Asian groups are discussed separately.

The number of significant associations observed between the FB and NB Hispanic groups suggest that parental nativity played a greater role in the behaviors of interest compared to Asian groups.

Hispanic Group

Overall, there appears to be a weak to moderate influence of parental nativity on preadolescent child eating habits and patterns, parent child-feeding behaviors, and family meals for Hispanic immigrant families having lived in the U.S. for more than ten years. Although not generally a considerable difference between parent nativity groups, there was a trend toward increased consumption of desserts and most American entrée foods by children of NB parents. By contrast, consumption of vegetables was typically lower and beverage consumption did not follow a consistent trend.

Hispanic NB parents were more likely to report frequent child-feeding behaviors generally viewed as positive. It is possible that NB parents were more likely to provide socially desirable responses. However, as discussed in the section below, this finding may be attributable to changes in parent nutritional beliefs or adoption of American

lifestyle-related dietary practices as a function of the acculturation process. Differences may also relate to overall parenting style. NB parents appeared more likely to have high demandingness[80] (i.e. control and supervision) based on their responses to the parent child-feeding questions. High demandingness is associated with both authoritarian and authoritative parenting styles. Previous research indicates that authoritative parenting styles, which involve a higher level of parent responsiveness (i.e. involvement, affection, and acceptance), are associated with more positive child eating habits and body weight outcomes.[25,32,80] For example, the ability to self-regulate energy intake and choose healthy foods is generally greater among children raised by authoritative parents.[25] Survey questions analyzed in the current study were not sufficient to assess parent responsiveness. Future research should examine this dimension of parenting style in order to gain better understanding of the association between parent child-feeding behaviors and acculturation.

Although the results of the current study suggest lower demandingness on the part of FB Hispanic parents, this was not necessarily consistent with unhealthy child eating patterns and habits. Indeed, although some differences in parent child-feeding behaviors existed between parent nativity groups, this was not reflected in the overall trends of children's eating patterns and habits relating to these behaviors. That is, children of NB parents had greater odds of frequently consuming soda, greater odds of skipping breakfast, and relatively equal milk-drinking tendencies compared to children of FB parents. It is possible that some parents' reported attempts to influence certain eating habits (e.g., eating breakfast) may be ineffective, as shown by children's reported eating

habits (greater odds of skipping breakfast). Alternatively, parents may engage in such behaviors because children have unfavorable habits (e.g. tendency to skip breakfast), and their habits would be even less favorable if not for parent intervention. Either way, there is an opportunity for intervention; Hispanic parents may need encouragement and strategies to improve children's dietary patterns and habits such as limiting availability of unhealthy foods. According to Arredondo et al.,[32] effective parenting techniques may include use of positive reinforcement through tangible and intangible rewards, setting appropriate limits, and avoiding overly restrictive behaviors.

In general, family meals were more likely to occur more than four times per week among families whose primary food-providing parent was NB. As with parent child-feeding behaviors, this may have been due to a greater likelihood of NB parents to provide socially desirable responses. Research indicates that children benefit significantly from eating with family several times per week.[18–20,65,69] Because FB parents were more likely to report infrequent family breakfasts and dinners than NB parents, they may benefit from targeted nutrition messaging promoting family meals. Due to positive effects of family meals on children's health and behavioral outcomes, increasing family meals may attenuate some of the negative child behaviors frequently described in the literature as associated with the acculturation process. Further research on family meals is needed to better ascertain their influence on health outcomes of acculturating children.

The following is an examination of the study's specific findings in relation to current research as well as a discussion of hypotheses and supplemental data regarding

characteristics of family meals and meals away from home. Finally, further applications to future research and nutrition intervention are suggested.

Hispanic Child Eating Patterns and Habits and Parent Child-Feeding Behaviors

For the Hispanic group, child consumption of dessert foods tended to increase with acculturation of parents. This finding is consistent with previous research.[43,89,98,103] Sanjur[2] indicates that sugar has become a common component of the diet in many regions of Mexico. By contrast, Romero-Gwynn and Gwynn[43] reported that in Mexico, use of sugar is not extensive. The researchers agree, however, that sugar consumption tends to increase upon immigration to the U.S., largely in the form of desserts and sweetened beverages. Romero-Gwynn and Gwynn[43] found an increase in ice cream consumption for Mexican American women upon immigration and still greater consumption in a sample of second generation women.[43] The current study revealed a different trend among children of FB and NB parents. However, chocolate bars and cake were significantly positively associated with nativity. These items may be consumed preferentially to ice cream by many children with NB parents.

Focus groups conducted with low income, Mexico-born mothers of preschool-aged children revealed that they were aware that high sugar consumption is unhealthy, and focused on limiting sugar intake in their children.[87] In the current study, children of NB parents were more likely to consume soda once per week or more than children of FB parents. The majority of parents whose children reported consuming soda once per week

or more indicated that they frequently tried to get them to drink less. This suggests that many parents are aware that soda consumption is an unhealthy dietary practice and respond to children's high intake by discouraging soda-drinking. However, the relatively frequent soda consumption by children of NB parents who report regularly trying to get their children to consume less may indicate that these efforts are not effective. Together with the results of dessert consumption, these findings indicate that Hispanic parents, particularly the more acculturated, may benefit from messaging discouraging excessive sugar consumption in children and providing strategies for minimizing children's intake.

Soda consumption among children of FB parents may be relatively low due to their greater likelihood of consuming fruit drinks once per week or more. This finding is consistent with previous studies.[89,105] Fruit-based beverages, such as *aguas frescas,* are traditionally consumed in many Hispanic cultures.[2,3,43,119] However, they tend to be lower in sugar and richer in micronutrients compared to some artificial fruit drinks listed as examples in the survey.[128–131] Children may have answered the survey questions pertaining to fruit drinks with traditional fruit-based beverages in mind. It is also possible that sugar-rich artificial fruit drinks such as Kool Aid® are being substituted for these traditional beverages. This is consistent with anecdotal reports from a registered dietitian working with Hispanic WIC participants in Washington State.[132] Interviews with Hispanic parents also revealed that provision of high-sugar fruit-flavored drinks to preadolescents was common[23] and another study[43] found that substitution of traditional fruit-based beverages with sugar-rich commercial beverages occurred with acculturation.[43] These sugar-sweetened beverages may be an inexpensive and appealing

alternative to traditional fruit-based drinks and some Hispanic parents may believe that they are healthy.[23] Parents need a better awareness of the lower nutrient density of such beverages and warning of potential high sugar content.

Milk consumption was approximately equal for both groups, which is consistent with one previous study.[43] However, parent encouragement of children's milk consumption at meals and snacks was reported as frequent by more NB parents. This may be due in part to parent participation in the national school lunch program as children, which provides milk to students at low or no cost. It is also possible that the long history of milk-promoting campaigns in the U.S., such as the Got Milk® campaign by the National Fluid Milk Processor Education Board, may have influenced NB parents to encourage milk-drinking more so than FB parents, who have likely had less exposure to such marketing. However, milk campaigns have begun marketing to Spanish-speaking populations in recent years, which may have also influenced awareness among less acculturated Hispanics.[133]

Children of FB Hispanic parents were more likely to consume select vegetables (carrots and broccoli) frequently. While only a small representation of the vegetable category, these results are consistent with previous research[12,13,90,96,100] and may be indicative of overall vegetable consumption. Previous research indicates that Hispanic parents are receptive to nutrition messaging focused on increasing fruit and vegetable consumption.[27] Therefore, national public health initiatives, such as the Fruits & Veggies

– More Matters™ campaign, should continue to address this issue and focus on targeting Hispanic audiences as has been done in some U.S. states.[123,134,135]

Overall, American entrée foods such as pizza and hamburgers were consumed more frequently by children of NB parents although few were statistically significant. The only exception to this trend was pancake, waffle, or French toast consumption, which were eaten more frequently by children of FB parents. This trend may be explained by the propensity for quicker acculturation of the breakfast meal.[136] Additionally, these foods may be adopted relatively quickly due to their similarity to some Hispanic foods such as Argentinian *panqueques* and Mexican sweet breads.

As stated below in the discussion of Asian children's eating patterns and habits, many of the entrée foods examined are common components of school lunches.[137] The fact that significant differences were observed in the Hispanic group despite more children of FB parents participating in the school lunch program may suggest that these meals are being served more at home by the primary food-providing parent. The lower frequency of consumption of these foods by children of FB parents is consistent with previous acculturation research.[43,89,105]

Previous research has revealed that consumption of American foods, including convenience foods such as pizza and cereal, increases with acculturation for Hispanic immigrants.[3,43,103,105] Studies have shown that FB Hispanic parents prefer to use fresh ingredients and view convenience and canned foods as unhealthy.[28,138] This belief may

diminish upon increased exposure to mainstream U.S. culture, resulting in increased consumption of these foods by children of NB parents.

Family Meals and Children's Breakfast Consumption

Families with NB Hispanic parents were somewhat more likely to consume breakfast together five or more days per week. By contrast, eating lunch together was more common in FB-parent families. This may be due to the Mexican tradition of consuming the largest meal in the afternoon followed by a light dinner.[43] According to interviews conducted by Cluskey et al.,[23] some Hispanic children only consume snacks at school and then eat their main meal of the day with the family upon returning home from school. This may explain some of the discrepancy between generally lower consumption of American entrée foods and significantly higher participation in the school lunch program by children of FB parents; such children may consume only snacks/side dishes provided by the school lunch program and avoid entrée foods.

Family dinners were consumed five or more days per week by more families with NB parents. This finding was statistically significant. However, family dinners occurred more than four days per week in 75% of FB families, indicating that family dinners are also a priority among families with less acculturated parents and that most children in this study likely benefit from family meals. Unfortunately, the majority of parents who reported infrequent family dinners also reported family breakfasts and lunches as infrequent, suggesting that their children may not benefit from frequent family meals.

Therefore, some Hispanic families, particularly those with less acculturated parents, may benefit from interventions focusing on increasing family meals.

Parents surveyed were asked to characterize their family dinners. The majority of both Hispanic parent nativity groups reported that dinner is "most of the time" or "always" their family's time to be together and talk. Meal-time television viewing was reported to be relatively low, and one-third of the Hispanic parents that indicated frequent television viewing during dinner reported consuming lunch together as a family. Therefore, these families still likely experience the benefits associated with family meals. However, meal-time television viewing should be generally discouraged due to associated negative health outcomes mentioned below in the discussion on the Asian group.

Although a relatively small proportion, a greater percentage of Hispanic FB parents replied "most of the time" or "always" to the statements, "at dinner, everyone is going in different directions, grabbing and running to eat on their own" and "our family schedules are too busy for us to eat together." The majority of these families also did not report consuming breakfast or lunch together regularly. These families may require more complex intervention strategies and/or more creative solutions from nutrition professionals. Family schedules may involve unavoidable conflicts, such as parents working evening shifts[139] or children participating in extracurricular activities.

Hispanic NB parents had greater odds of trying to get their children to eat breakfast. This may be due to lower participation in the school breakfast program by

children of NB parents; not eating breakfast at school may prompt parents to encourage this behavior. Cluskey et al.[23] revealed that breakfast is the meal most often self-prepared by children and that children sometimes have to be encouraged to eat breakfast because of busy morning schedules and wanting to sleep late rather than eat.

While not a considerable portion of the sample, some Hispanic children, particularly those of NB parents, reported not consuming breakfast at all. Due to its reported effects on health and cognitive functioning,[23,53] breakfast eating should be promoted. A possible solution to this problem would be encouraging these children to participate in the school breakfast program.

Meals Away From Home

American lifestyle includes frequent meals consumed outside the home.[75] In general, Hispanic NB parents reported slightly higher frequency of consuming meals away from home, which is consistent with previous research and adoption of American lifestyle.[33,44,90] This finding may also be due in part to the FB group having larger families. Research has indicated that frequency of meals away from home is lower in larger families due to the increased cost.[23]

Parents were asked the main reasons for eating meals away from home. Parents from both groups responded that their families do so for celebrations or as a reward. NB parents cited celebrating special occasions and spending time with friends as main

reasons for eating meals away from home. For FB parents, top reasons were celebrating special occasions, spending quality time as a family or with friends, and being too busy to cook. The greater percentage of FB parents who reported spending quality time as a family as a reason for eating meals away from home is consistent with the lower incidence of family dinners reported by FB parents; for some families with FB parents, spending time together as a family may be considered a special occasion and thus warrant eating away from home. Consumption of meals away from home should be discouraged due to their association with negative health outcomes such as increased BMI and higher energy density.[33,75,76] If consumption of meals away from home is unavoidable, parents should be educated on healthful food choices.

Additional Opportunities for Nutrition Intervention among Hispanics

Previous studies have found that Hispanic parents are open to nutrition education and messaging.[28,87,138] Montoya et al.[112] examined differences between US- and Mexico-born Mexican Americans in a border region of Texas. They found that although dietary patterns did not differ between the two groups, nutritional beliefs did. Dietary self-efficacy was greater for and dietary importance was ranked more important by Mexico-born Mexican Americans. The study further showed that their dietary self-efficacy and beliefs were not affected by socioeconomic status. As discussed above, previous research[28,138] found that FB Hispanic women viewed fresh foods as healthier and were reluctant to incorporate convenience foods into their diets. These findings are supported

by the current study, which revealed that although all children were born and/or raised in the U.S., children of FB parents reported slightly less frequent consumption of convenience foods and desserts and more frequent consumption of some vegetables. Previous studies have also shown that parents are key influencers of food choices in adolescents[24,78] and that parenting styles and child-feeding behaviors have a significant impact on eating behavior and/or weight status of children.[32,80] These findings together present a valuable opportunity for nutrition intervention. Dietary practitioners should focus on reinforcing these positive dietary behaviors in first generation Hispanic parents in addition to making suggestions for areas for improvement, such as reducing consumption of sugar-sweetened fruit drinks and increasing frequency of family meals and positive child-feeding behaviors. These efforts may significantly reduce the negative dietary changes that may accompany acculturation, as observed in previous studies and reflected in some outcomes of the current research.

Montoya et al.[112] found that for U.S.-born Mexican Americans, dietary self efficacy increased with greater education but decreased with greater income. The decrease may be due to a rise in working mothers with less time for meal preparation. Montoya's findings together with the results of the current study suggest that nutrition intervention for NB Hispanics should focus on educating parents to improve dietary self-efficacy and nutritional outcomes. Special attention should be paid to reinforcing healthy behaviors, such as frequent family meals, and to discourage consumption of convenience foods and desserts. Potential strategies include substitution of less healthy foods and beverages with inexpensive, expedient, appealing, and more nutritious alternatives.

Outreach organizations such as land grant universities frequently provide multilingual resources that address some of these issues and should be promoted to families as appropriate.

Asian Group

The lack of significant findings from the Asian group suggest that parental nativity does not greatly influence child eating patterns and habits, parent child-feeding behaviors, and family meals after a significant length of time in the U.S. A possible explanation for the lack of differences may have been due to the large percentage of the NB group residing in Hawaii. In Hawaii, Asians constitute the largest racial group[88] and thus may experience less need to conform to typical American lifestyles and diets. This would minimize differences between FB and NB parent nativity groups. However, some previous research has also indicated that fewer dietary differences exist between generations of Asian immigrants than for Hispanic immigrants.[13] Despite the lack of statistically significant differences, some interesting trends were revealed by the data and warrant further investigation and discussion.

Child Eating Patterns and Habits and Parent Child-Feeding Behaviors

Children of FB Asian parents were somewhat more likely to report consuming select vegetables (broccoli and carrots) frequently. This is to some extent consistent with previous studies that have shown that vegetable consumption is not highly associated

with acculturation level among Asian immigrants[13,38,110] One study[38] noted that consuming a diet high in fruits and vegetables was a priority among Chinese American women.

Dessert consumption was shown to be a relatively quick dietary adaptation upon immigration in some studies,[15,94,95] including one study on children.[94] This appears to be consistent with the current research. Overall, ice cream and chocolate bars were popular desserts, while cake was consumed frequently by only a small proportion of children. As with Hispanic immigrants, excessive sugar consumption should be discouraged among children due to negative effects on health and weight status.[140]

After controlling for parent education and employment, children of NB Asian parents had greater odds of consuming the American entrée foods examined. The greater odds of frequent consumption of breakfast foods by children of NB parents is somewhat inconsistent with studies showing that breakfast is the first meal acculturated among Asian immigrants; it would be expected that these foods would be consumed more equally by children growing up in the U.S.[26,47,108] Child reports of consumption of American lunch and dinner foods (macaroni and cheese, pizza, and hamburgers or hot dogs) were fairly similar between the two groups, which may be attributable to the fact that these foods are commonly served in school cafeterias so the exposure of children to them would not vary with the nativity of the parent; approximately two-thirds of children from both groups reported participating in the school lunch program. It is also consistent with evidence that indicates that immigrant children are more likely to acculturate their

foods to their peers.[25] The slightly greater consumption of American entrée foods by children of NB parents indicates that these foods are likely served more frequently at home or obtained through meals away from home.

Satia-Abouta et al.[38] reported that for Asian immigrants, older relatives living in the home tend to influence the family's retention of traditional diets and reduce dietary acculturation. Children are more likely to influence the family in the opposite direction, toward adoption of American foods.[26,38] In the current study, a greater percentage of the FB group reported living with older relatives and adult children, yet significant differences were not found between the diets of the two groups. It is possible that preferences of adult children may somewhat counter the influence of older relatives on the family's diet. However, the influence of adult children on family diet is not addressed in existing literature.

An interesting finding from this study is the equal odds of frequent milk consumption by children of FB and NB Asian parents. This finding is surprising in light of previous research. Allen et al.[13] showed that milk consumption increased with each subsequent immigrant generation of Asian adolescents. Asians are known to have high rates of lactase deficiency.[110] However, only seven percent of children from each parent nativity group reported getting stomach aches after consuming milk. This relatively low percentage of children[141] reporting an adverse effect of milk consumption may partially account for this inconsistency. However, the low incidence may also be the result of response choice on the survey instrument.

Asian NB parents were slightly more likely to encourage milk consumption at meals and snacks. Unadjusted data reveal that encouragement of milk-drinking was much less frequent among both parent groups at dinner than at breakfast. This is consistent with previous research. Lv and Brown[26] found that first generation Chinese American parents were aware of the importance of milk for children's health and were supportive of them drinking milk at non-culturally important meals. Another study similarly reported that milk drinking was less common at dinner for Asian immigrants.[23] These findings may indicate that retention of traditional dietary habits at dinner was a priority among the current sample.

In the current study, children of FB Asian parents had considerably greater odds of consuming juice on a frequent basis. Previous acculturation studies on adult Asian Indians[15] and adult Japanese American women[93] reported an opposite trend. Cluskey et al.[23] reported that many Asian, Hispanic and non-Hispanic white parents found juice and fruit drinks to be healthy substitutes for milk. It is possible that juice is served at times when milk is deemed to be culturally inappropriate, such as at family dinners. Alternatively, juice consumption among children of FB parents may be high due to parents' tendency to allow children to choose their own beverages. Cluskey et al.[23] found that this was common practice among parents and that juice is typically more popular than milk among children.

Soda and fruit drink consumption were relatively equal among children of both Asian parent nativity groups. These findings are consistent with previous research.

Demory-Luce et al.[104] reported that sugar-sweetened beverages were found to be among the most often incorporated American foods and beverages for preschool-aged children of FB Chinese Americans; this may indicate that sugar-sweetened beverages are incorporated relatively quickly into the diet and differences are not detectable based on parental nativity after living in the U.S. for more than ten years. Further, Allen et al.[13] found no significant differences in soda consumption between immigrant generations of Asian adolescents. In the current study, frequent consumption of fruit drinks was slightly higher than soda consumption among children of both groups. Soda is more expensive than many fruit drinks and thus may be purchased less frequently. As stated in the discussion on the Hispanic group, it is also possible that children and parents believe fruit drinks to be healthy and are unaware that many fruit drinks contain little juice but high amounts of sugar. Parents should be informed of the low dietary quality of sugar-sweetened beverages and encouraged to limit soda and sugar-sweetened fruit drinks. Examination of parent child-feeding behaviors indicates that there is an opportunity to decrease children's soda consumption by engaging parents: frequent soda consumption was much less frequent among children whose parents reported frequently discouraging soda consumption.

In the current study, only one Asian child (of NB parents) reported not eating breakfast. This result is somewhat inconsistent with previous research. Franzen et al.[94] reported that for Hmong adolescents, skipping breakfast was done occasionally due to lack of time. Lv and Cason[95] reported that approximately one-third of adult first generation Chinese-Americans skip breakfast regularly. Pan et al.[114] found that nearly

half of newly immigrated Asian college students regularly skip breakfast. Results from the current study may suggest that younger adolescents have not yet developed the habit of skipping breakfast that was previously observed in studies on older populations. The majority (approximately 90%) of both FB and NB parents reported encouraging their children to consume breakfast frequently. These are important findings for dietetics practitioners; among Asian immigrant populations, breakfast-eating should be promoted from a young age in an effort to establish and maintain this healthful dietary practice for a lifetime. Parental encouragement of breakfast-eating should also be reinforced because it appears to be effective in promoting children's breakfast consumption in the current sample.

Family Meals

Families with FB Asian parents were slightly more likely to report eating lunch and dinner together five or more days per week. However, some considerable differences were noted in parents' descriptions of family meals. While parents generally described family meals positively, more FB parents reported negative meal characteristics and behaviors than NB parents.

While the majority of both groups reported that dinner was usually a time to be together and talk, a marginally greater proportion of FB parents reported that this was never or rarely the case. Additionally, considerably more FB parents reported that their families eat dinner together in front of the television always or most of the time. The

majority of these families did not report eating other meals together frequently. Two studies[13,37] on Asian immigrants found that less acculturated children and adolescents spent more time watching television than their more acculturated counterparts. However, these studies did not address whether screen time occurred during family meals.

Families who eat in front of the television, rather than conversing with one another, may become more quickly acculturated due to the lack of opportunity to pass on cultural values and because of increased exposure to mainstream culture. Because mealtime television viewing provides less opportunity for family discussion, adolescents may not experience the psychological and behavioral benefits associated with family meals. For immigrants, television viewing also provides exposure to American foods, many of which are processed and energy dense.[142] As was shown for Hispanic youth in a previous study,[142] this exposure may contribute to increased consumption of these foods and subsequent decline in nutritional status. Dietetics professionals should be aware of this potential trend and promote the benefits of family interaction during meals on children's overall health.

While a small percentage of the overall group, a somewhat greater proportion of FB parents reported that "at dinner, everyone is going in different directions, grabbing and running to eat on their own" than NB parents. Similarly, slightly more FB parents reported that their families' schedules were always or most of the time too busy to eat together. The majority of parents who responded this way reported eating dinners together only 0-2 days per week. Such "on the run" lifestyles often lead to increased

consumption of meals away from home and unhealthy convenience foods.[23,27,28] Families with busy schedules at mealtimes require creative intervention strategies to increase frequency of family meals and diet quality within the context of their lifestyles.

Previous research has revealed that for many immigrants, family meals provide a means of passing on cultural values to children.[59,63] In addition to potential loss of cultural heritage, having few quality family meals could result in lower dietary quality[20,21] and loss of additional benefits associated with family meals, e.g. higher self esteem and greater academic success.[19] Although the relative frequency of family meals was high in this study, parent characterization of family meals reveals some areas for improvement. Further research on larger, culturally specific populations is needed to learn more about the nature of family meals for Asian immigrants and to develop appropriate nutrition interventions.

Meals Away from Home

Families with NB Asian parents had greater odds of consuming meals away from home once per week or more. This is consistent with previous acculturation studies on Korean American[45] and Japanese American women[93] as well as Asian adolescents.[44] In the current study, being too busy to cook was reported to be a main reason for consuming meals away from home, particularly for NB parents. Previous studies have shown negative health effects of consuming meals away from home.[33,75,76] Therefore, nutrition professionals should be aware of this consistent trend among more acculturated Asian

immigrants and the potential impact that this might have upon their overall health. Meals away from home should be discouraged and alternative solutions for busy parents suggested. As stated previously for the Hispanic group, parents should also be educated on healthy food choices when consuming meals away from home in order to minimize the potentially adverse nutritional impact of doing so.

Nutrition Intervention Opportunities for Asian Immigrants

Previous research has recommended that nutrition intervention for Asian immigrants focus on encouraging the retention of traditional dietary practices.[3,38] However, some degree of dietary change is inevitable and not all dietary changes are considered unhealthy. Nutrition intervention should provide guidance for healthful dietary acculturation, such as choosing healthy American foods.[3] Based on findings from the current study, this should include a focus on sugar-sweetened beverages and dessert foods. As mentioned above, attention should also be paid to learning more about the nature and quality of family meals and creating targeted messages and strategies to maximize their benefits. Reduction of meals away from home may be achieved through creative solutions for managing more home based cooking amid busy lifestyles.

Limitations

This study provides a unique look at potential relations between parent acculturation and behaviors and food-related habits of their children and families. Few quantitative studies include information from both parents and their preadolescent children. This study is also valuable because it identifies potential areas for future research and dietary intervention.

Despite its strengths, this study has a number of limitations. First, although efforts were made to diversify the sample, the sample used to address research questions was small and nonrepresentative. Additionally, no specific information is available regarding the countries of origin of the individuals who self-identified as Asian or Hispanic. There are significant differences between and within populations from various countries, making application of previous research to the current sample difficult. Also, the food frequency questionnaire used in this sample focused on calcium-rich foods and did not contain information on many other foods that may have yielded different results. Foods selected to measure differences between groups were based on previous research findings but may not have been representative of diet changes in this sample. Additionally, although food frequency questionnaires have been validated for use with young people, misreporting is common.[143]

The small sizes of both groups, particularly the Asian group, necessitated the use of exact methods, which are often conservative.[144] The small sample sizes also did not allow for analysis and adjustment without dichotomizing responses.

Due to the size and nature of the sample, statistical analysis did not allow for stratification by geographic location. Future research should account for this factor. It should be noted that a large portion of the Asian sample came from Hawaii and a large portion of the Hispanic sample came from Arizona. This lack of geographic diversification makes generalizability of the results to the U.S. population of Asian and Hispanic immigrants even less appropriate.

These limitations in sample size and characteristics emphasize the need for future research on larger, representative samples.

The use of nativity as a proxy measure of acculturation presents another limitation in that it may have resulted in misclassification of some parents. For example, some parents included in the foreign-born sample may have emigrated at a young age and grown up in the same sociocultural context as those in the native-born sample. Use of acculturation scales may reduce the likelihood of misclassification. However, nutrition professionals frequently do not have extensive client information available and may find research based on simple proxy measures more applicable to practice.

Conclusion

This study found that the eating patterns and habits of Asian preadolescent children were not significantly associated with parental nativity. Trends indicated greater consumption of American entrée foods, and some sweets and lower consumption of vegetables by children of NB parents. Some associations with parental nativity were present for the Hispanic group. Children of NB parents had significantly greater odds of consuming some entrée foods, desserts, and soda. This suggests that Hispanic children's eating patterns and habits are somewhat influenced by their parents' acculturation but overall associations were weak to moderate. More research is needed using comprehensive and culture-specific food frequency questionnaires to confirm these findings. Relatively high consumption of sugar-rich foods and beverages among children of NB parents suggests that these parents may benefit from intervention encouraging reduction of sugar intake among children.

Parent child-feeding behaviors were fairly similar between FB and NB Asian parents but some positive trends were revealed between acculturation and frequent engagement in the behaviors examined. For the Hispanic group, some associations were found between parental nativity and parent-child feeding behaviors and trends were all positive. However, trends in parent child-feeding behaviors were not always consistent with children's reported eating patterns and habits for the Hispanic group, suggesting an area of focus for nutrition intervention.

Consumption of meals away from home was not significantly associated with

parental nativity for Asian or Hispanic families, but trends indicated greater frequency of eating away from home with acculturation. Overall, families of both Hispanic and Asian groups reported frequently eating dinner together. Among Hispanics, families with NB parents had significantly greater odds of consuming breakfast and dinner together five or more times per week. A slightly greater proportion of both Asian and Hispanic families with FB parents reported often eating meals in front of the television or having scheduling conflicts at dinner time that prevented the family from eating together. These findings present opportunities for nutrition intervention; families should be discouraged from watching television during mealtimes and some may benefit from strategies for having family meals despite busy schedules.

This research shows weak to moderate influence of parental acculturation on the eating patterns and habits, parent child-feeding behaviors, and family lifestyles of Hispanic families. While some interesting findings were revealed among Asian families, none were significantly associated with parental acculturation. Due to utilizing a small, nonrepresentative and non-culturally specific sample, these findings are not generalizable. However, results highlight some important areas of focus for future research and dietetics practice. Further, the relative similarity between parent nativity groups indicates that many interventions targeting Asian and Hispanic families with preadolescents may be applicable to families with both more and less acculturated parents. Further research is needed on larger, representative, and culturally specific populations to better understand the influence of parental acculturation on child outcomes and applications to dietetics practice.

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APPENDIX

Appendix A: Summary of Acculturation Studies

Multiple databases (1Search, PubMed, AnthroSource and Sociological Abstracts) were searched for the acculturation and related articles below. Search terms included: acculturation, diet, dietary acculturation, Hispanics, Latinos, Asians, immigrants, and nativity. Additionally, many studies cited within articles found in this manner were located and included below. Some studies included did not explicitly examine acculturation, but investigated pre- and post-migration diets (Dodson et al.[74] and Pan et al.[114]), dietary differences between country-of-origin-residing and U.S.-residing individuals (Kim et al.[118]) or dietary differences based on age, education and length of time in the U.S. (Chau et al.[108] and Raj et al.[15]).

Study	Population	Sample Design & Location	Acculturation Measure(s)	Key Findings Relevant to the Current Study
Akresh,[7] 2007	First generation Hispanic adults	New Immigrant Survey	Years in the U.S., language use	Greater dietary change is associated with higher acculturation. For women, greater dietary change was related to have a U.S.-born spouse. Speaking English at work was related to greater dietary change for men. English proficiency and use of English with friends were not associated with dietary change. Older women and more educated women exhibited lower levels of dietary change. The authors suggest that education may result in value being placed on traditional dietary practices. Greater level of acculturation was associated with self-reports of worse health since immigration.

Study	Population	Sample Design & Location	Acculturation Measure(s)	Key Findings Relevant to the Current Study
Aldrich and Variyam,[99] 2000	Adults Hispanics and NHW	Continuing Survey of Intake by Individuals	Spoken language	Based on the USDA's healthy eating index, less acculturated Hispanics had a higher diet quality score than more acculturated Hispanics and NHW but the lowest scores on nutrition content knowledge and diet-disease awareness. Authors speculate that this may be a result of limited ability to read food labels and nutrition information and recommend integrating some traditional Hispanic foods into dietary recommendations and guidelines. Less acculturated Hispanics consume less fat and saturated fat, and more fiber and cholesterol than NHW and more acculturated Hispanics. More acculturated Hispanics had lower diet quality scores than NHW and less acculturated Hispanics.
Allen et al.,[13] 2007	NHW, Asian American and Hispanic adolescents ages 12-17	Random sample in California	Generation	There were no intragroup differences in fruit, vegetable or soda consumption for Asian Americans. Milk consumption doubled between first and third generation Asian Americans. Increasing generations of Hispanics consumed lower amounts of fruits and vegetables and more soda. Asian Americans showed an increasing trend in physical activity across generations but were not significant after adjusting for gender, age, parent's education, poverty level, and rural versus urban residence. After adjustment, first and second generation Asian Americans showed higher television viewing and video game playing than the third generation. Researchers concluded that Asian Americans tend to maintain or improve health behaviors (not specific to nutrition) across generations but health behaviors of Hispanics tend to resemble non-Hispanic white or deteriorate across generations.

Study	Population	Sample Design & Location	Acculturation Measure(s)	Key Findings Relevant to the Current Study
Ayala et al.,[33] 2008	Hispanic parents of children in kindergarten through 2nd grade	Convenience sample in Southern California	Acculturation Rating Scale for Mexican-Americans-II developed by Cuéllar and colleagues	Less healthy dietary behaviors were exhibited by more acculturated families. Children who ate at relatives/friends/neighbors (RNF) homes at least once per week had higher rates of obesity and higher intake of sugar-sweetened beverages. Children who ate at fast food establishments or restaurants once per week or more had higher consumption of sugar sweetened beverages, sweets, and snacks. Eating at restaurants at least once per week was higher for children with more acculturated parents. Away from home food intake, including RNF eating, was associated with increased likelihood of overweight among children. Second generation immigrants had 27% higher odds of eating at RNF homes at least once per week than first generation. Dietary intake and obesity were not related to restaurant type.
Chau et al.,[108] 1990	Elderly foreign-born Chinese American women (over 60 years old) from Taiwan and Hong Kong.	Convenience sample in San Francisco Bay Area	Examines trends based on age, language, education and length in the U.S.	Breakfast was the most meal most likely to include American foods while lunch and dinner meals consisted primarily of Chinese foods. Women consumed milk more frequently than any other American food. Women with higher education and greater English reading ability consumed significantly more American foods. Length of time in the U.S. was not related to use of American foods. English reading ability and education were negatively correlated with the traditional practice of balancing yin and yang foods while age and length of time in the U.S. were positively correlated with this practice. Researchers speculate that older women may have less exposure to U.S. culture.

Study	Population	Sample Design & Location	Acculturation Measure(s)	Key Findings Relevant to the Current Study
Chen,[37] 2008	8-10 year old Chinese American children and their mothers	Convenience sample in San Francisco Bay Area	Suinn-Lew Asian Self-Identity Acculturation Scale. Covers language, identity, friendships, behaviors, general and geographic background, attitudes	High levels of maternal education and income were significantly associated with high acculturation. Acculturation and education were not associated with maternal health or health behaviors but high acculturation was associated with low child BMI and less screen time for children. High household income was related to poor dietary behaviors but lower obesity; it was associated with low maternal BMI, high maternal intake of fats and sweets, low child BMI, and high child physical activity.
Demory-Luce et al.,[104] 2005	Chinese American preschool-aged children and their first generation primary caregivers	Convenience sample in Houston Chinatown.	Suinn-Lew Asian Self-Identify Acculturation Scale	Overall, caregivers' acculturation level was low but education was relatively high (26% high school degree and 73% college or postgraduate degree). Forty-three percent of foods consumed at home were Chinese, 26% were American foods and 31% were common to American and Chinese cultures. American foods commonly consumed included sweetened beverages, desserts, candy, bread, salty snacks, high-fat meat and breakfast cereals.
Diaz et al.[78], 2009	Hispanic high school-aged adolescents	Random sample from 4 high schools in San Bernardino, CA	Condensed Short Acculturation Scale for Hispanics. Includes language read and spoken, language spoken at home, language used for thinking and language used with friends.	Less acculturated adolescents had greater intentions of consuming a healthy diet, greater support for consuming a healthy diet, and increased readiness to give up foods they liked for the sake of better health. Both males and females were influenced by their mothers but influence was stronger on females. Motivations for consuming a healthy diet differed between males and females.

Study	Population	Sample Design & Location	Acculturation Measure(s)	Key Findings Relevant to the Current Study
Dixon et al.,[89] 2000	Mexican American adults	Random sample: NHANES III	Nativity, spoken language	In general, U.S.-born Mexican Americans consume diets higher in fat and lower in fiber than Mexico-born. Mexico-born adults had larger families, lower education, and lower income. Mexico-born adults had healthier nutrient intakes than U.S.-born adults. Vitamins consumed in higher quantities by Mexico-born men and women included folate, vitamin B6, vitamin C and calcium. Mexico-born adults consumed higher quantities of fruits, fruit juices, vegetables, grains, and legumes while U.S.-born adults consumed greater amounts of salty snacks, desserts, and added fats.
Dodson et al.,[74] 2005	Hispanic adult women, all but one participant was foreign-born	Convenience sample in Scott County, MS	Examines pre- and post-migration diets	Major interview themes involved food preparation and diet quality. Many women thought that food preparation is more problematic in the U.S. due to work schedules. The majority asserted that food is more abundant but less healthy and more artificial than in their countries of origin. Forty-four percent of participants thought that food was more expensive in the U.S. Participants were dissatisfied with the quality and nutritional value of school lunches. Consumption of milk and cheese, pasta, hamburgers, pizza, vegetables, pork and chicken were higher in the U.S. while consumption of tortillas, beans, corn, fish, and eggs were lower.
Duffey et al.,[98] 2008	Hispanic adults	Random sample: NHANES 1999-2004	Nativity	Researchers controlled for income, age, gender, and education. Foreign-born adults had healthier diets, with greater intakes of legumes, fruits, rice and high fiber breads. Native-born adults consumed more fast food, snacks, and desserts.

Study	Population	Sample Design & Location	Acculturation Measure(s)	Key Findings Relevant to the Current Study
Franzen and Smith,[94] 2009	9-18 year old native- and foreign-born Hmong children	Convenience sample; focus groups in St. Paul/ Minneapolis, MN	Short Acculturation Scale for Hispanics (Marin, Sabogal, Marin, Otero-Sabogal, & Perez-Stable, 1987).	US-born adolescents were more acculturated in language use and social connections than foreign-born adolescents. They were also taller and had higher BMIs on average. Most children reported eating school lunches and perceived them negatively. For many children, dinner usually included a rice dish and stir-fried vegetables or soup, but some reported consuming convenience foods for dinner during the week and eating traditional Hmong meals on weekends. Rice was considered a significant part of the diet for both foreign- and native-born children. For foreign-born children, snacking and dessert consumption were new additions to their dietary patterns. Native-born children reported greater consumption of American foods in general and at dinner.

Study	Population	Sample Design & Location	Acculturation Measure(s)	Key Findings Relevant to the Current Study
Franzen and Smith,[27] 2009	First and second generation Hmong adults over 18 years old.	Convenience sample in Minneapolis and St. Paul, MN	Adaptation of "A Short Acculturation Scale for Hispanics" (Marin, Sabogal, Marin, Otero-Sabogal, & Perez-Stable, 1987). Questions pertained to language use, media, and ethnic social relations	Acculturation was positively associated with years lived in the US, household size and income, and negatively associated with food assistance program usage. Although some foreign-born Hmong had been in the US for an equal number of years as U.S.-born Hmong, they were less acculturated and rated their diets as better. U.S.-born Hmong had slightly higher BMI than foreign-born. The majority, including U.S.-born, reported that their children's friends were of Hmong ancestry. Overall, native-born Hmong consumed more American foods than foreign-born but 80% of all groups reported consuming more Hmong foods than American or equal amounts. Snacks and desserts were not common. Food insecurity in their countries of origin led to excessive consumption in the U.S. and a preference for larger body size in children. Younger participants preferred high-fat cooking methods, less rice, and more convenience/processed foods compared to older participants. A common practice was to consume convenience foods for dinner and cereal for breakfast during the week and prepare traditional meals on the weekends.
Gardner et al.,[106] 1995	Hispanic men of Mexican or Central American heritage ages 19-50 years	Convenience sample in San Francisco area	Acculturation scale addressing language, socialization, food, media and music preferences, years in the U.S., and self-identification	On average, socioeconomic status and education levels were low. Acculturation was not related to income or occupation but was positively associated with education. Mean intake levels of all nutrients were at or above 100% of the U.S. Recommended Daily Allowances. Participants reported higher intakes of sugared drinks, poultry, wheat and prepared foods high in fat and lower intakes of lard, margarine, cheese, fish, pork, and poultry skin compared with their intake prior to migration. Almost half of participants' calorie intake was composed of traditional foods. No significant correlations were found between acculturation and food intake.

Study	Population	Sample Design & Location	Acculturation Measure(s)	Key Findings Relevant to the Current Study
Gordon-Larson et al.,[90] 2003	Mexican American, Cuban American, Puerto Rican, and NHW adolescents in grades 7-12	National Longitudinal Study of Adolescent Health: nationally representative study	Nativity; also examined impact of other acculturation factors such as language on overweight-related behaviors	First generation adolescents had lower income and maternal education. First generation Mexican American and Puerto-Rican adolescents spoke significantly less English at home. Compared to native-born Mexican Americans, foreign-born Mexican Americans watched significantly less television and videos. For dietary intake, generation differences were found based on country of origin; foreign-born Mexican Americans consumed significantly less cheese, low-fat version foods, fast foods, and ate dinner significantly less frequently. They consumed significantly more rice, beans, fruits, vegetables, and ate lunch significantly more frequently. Island-born Puerto Ricans consumed significantly more milk and fruit and consumed breakfast and dinner significantly more often. Foreign-born Cubans consumed significantly more vegetables. Overall, foreign-born Hispanic adolescents ate breakfast more frequently than native-born Hispanic adolescents.

Study	Population	Sample Design & Location	Acculturation Measure(s)	Key Findings Relevant to the Current Study
Guendelman and Abrams,[91] 1995	U.S.-born and Mexico-born Mexican American women aged 16-44 years and non-Hispanic white (NHW) women aged 16-44 years.	Representative sample of Mexican Americans living in the Southwest U.S.: Hispanic Health and Nutrition Examination Survey (HHANES). NHW data from National Health and Nutrition Examination Survey II (NHANES II)	Generation	Researchers examined intake of energy, protein, calcium, iron, zinc, and vitamins A, C, E and folic acid. First generation Mexican American women had the lowest education and income and were least likely to work outside the home. After adjusting for smoking, pregnancy status and sociodemographic factors, second generation Mexican American women had significantly greater risk of inadequate dietary intake than first generation Mexican American women. First generation Mexican American women consumed significantly greater quantities of protein, carbohydrates, cholesterol, vitamins A and C, folic acid, and calcium than other women. Lower income was associated with poor dietary quality amongst NHW women but higher dietary quality among first generation Mexican Americans. No association was found between income and dietary quality among second generation Mexican Americans. Contrary to NHW, no relation was found between education and dietary quality for Mexican Americans.
Herbert et al.,[110] 2001	Vietnamese American adolescents	Convenience sample in Worcester, MA.	English language proficiency	Vietnamese students consumed more fruits and vegetables and less dairy than other adolescents. Fruit, vegetable, and dairy intake was higher among more acculturated students. Lower dairy intake by low acculturated Vietnamese students may be attributable to high prevalence of lactase deficiency. Additionally, researchers note that differences may be due to the high cost of fruit and low availability of fresh milk in Vietnam, therefore making fruit and milk consumption less habitual for low acculturated students.

Study	Population	Sample Design & Location	Acculturation Measure(s)	Key Findings Relevant to the Current Study
Kandula et al.,[6] 2008	Hispanic and Chinese American adults aged 45-84	Recruited from six field centers: Baltimore, MD; Chicago, IL; Forsyth County, NC; Los Angeles, CA; New York, NY; St. Paul, MN. Ethnic groups were recruited from only 1-3 sites.	Nativity, language spoken at home, years in the U.S.	Hispanics and Chinese American participants with higher acculturation had higher income and education. For Mexican American Hispanics, occurrence of diabetes was lowest among the highest acculturated but no significant trend was observed. For non-Mexican-origin Hispanics, greater acculturation was associated with higher diabetes prevalence after controlling for sociodemographics. Diabetes prevalence was not associated with acculturation for Chinese Americans. High acculturation was associated with more physical activity for Hispanics and Chinese Americans but higher BMI. Lower energy intake was positively associated with acculturation for Mexican Americans. High acculturation was associated with greater energy and carbohydrate and lower fat intake for Chinese Americans.
Kim et al.,[118] 2007	Adult hypertensive and normotensive Korean Americans and native Koreans	Convenience sample from Chicago and a semi-rural community in South Korea	Compares native Koreans and Korean Americans	No statistically significant differences in dietary intake were found between hypertensive and normotensive Korean Americans. Overall, Korean Americans ate more American foods and foods away from home than native Koreans. Korean Americans consumed less sodium, potassium, fruits, vegetables, and energy from carbohydrates than native Koreans. Dietary quality index scores for Korean Americans were not significantly different than native Koreans.

Study	Population	Sample Design & Location	Acculturation Measure(s)	Key Findings Relevant to the Current Study
Kudo et al.,[93] 2000	Second generation Japanese American mothers and their adult Japanese American daughters	Convenience sample in Los Angeles, CA	Generation	Third generation daughters ate significantly fewer meals than their mothers, skipping breakfast most frequently. Daughters ate foods away from home significantly more often than their mothers. Foods consumed more frequently by daughters included hamburgers, pork, cheese, potatoes, fresh fruit, pasta, fruit juice, pancakes, salty snacks, and chocolate candy. Foods consumed more frequently by mothers included fish, butter, legumes, fresh vegetables, rice, tofu, breakfast cereals, cake/pie, and Japanese condiments (soy sauce, miso). Not all differences were statistically significant. Researchers compared intake with a food scheme reflecting the traditional Japanese diet at the time of their ancestors' migration. Rice maintained the same hierarchy within the food selection scheme while eggs, beans/legumes/tofu, and seafood were replaced by meats and dairy and condiments were replaced by fat. Compared to their mothers' food hierarchy, soda and snacks moved up in daughters' hierarchy and fruits were replaced by sweets.
Lee et al.,[97] 1999	Korean American adults	Nationally representative sample	2-culture matrix model and 3 acculturation dimensions	Korean Americans were divided into three categories: traditional, bicultural, and acculturated. Acculturated individuals were youngest and had the most American education. American foods were most commonly consumed at breakfast and lunch, with Korean foods most commonly being consumed at dinner. Intake of American foods increased and Korean foods decreased with acculturation; rather than American foods simply being added to the diet, they appeared to replace Korean foods. Commonly consumed American foods were: oranges, low-fat milk, bagels, tomatoes, and bread. These foods were consumed most often by the bicultural and acculturated groups. Dietary quality did not differ between groups.

Study	Population	Sample Design & Location	Acculturation Measure(s)	Key Findings Relevant to the Current Study
Lin et al.,[92] 2003	Hispanic and non-Latino white elderly adults aged 60-92. Places of origin included Cuba, Puerto Rico, Mexico, Dominican Republic, Central America and South America	Representative sample of elderly in Massachusetts	Language use - speaking, reading, and writing	Among Cuban and Dominican elders, higher acculturation was associated with increased fruit and breakfast cereal consumption and decreased rice consumption.
Liu et al.,[109] 2010	Chinese American adult women aged 40 and older	Convenience sample	Scale assessing English proficiency and level of interaction with members of mainstream society	More acculturated women were more likely to have had longer US residence and higher education than less acculturated women. Among women with less than a high school education, more acculturated women had higher dietary variety and adequacy but lower moderation. Acculturation was not associated with these factors for women with at least a high school education.

Study	Population	Sample Design & Location	Acculturation Measure(s)	Key Findings Relevant to the Current Study
Lv and Cason,[95] 2004	Chinese American adults	Convenience sample in Philadelphia, PA	Length of U.S. residence, English proficiency, number of congenial American friends	Since immigration, 22.5% of respondents decreased and 16% increased the number of meals consumed daily. Approximately 65% reported skipping breakfasts. More participants thought their diet was healthier since immigrating to the U.S. or equally healthy than thought their diet was less healthy. Consumption of Western foods increased upon immigration in each main food category. Food items with a significant increase included pizza, breakfast cereal, sandwiches, hamburger, hot dog, low-fat milk, ice cream, doughnuts, chocolate, cakes, and soda. Dietary variety increased significantly after immigration but consumption of traditional foods decreased. Convenience and availability were the main factors affecting food choice, followed by cost. More acculturated respondents, as measured by length in the U.S. consumed more fruits, vegetables, grains, meats/meat alternatives, fats/sweets, and beverages.
Montez and Eschbach,[96] 2008	Mexican American women aged 25-64 years	2000 National Health Interview Survey: nationally representative, random survey	Nativity, language	U.S.-born women consumed higher percentage of energy from fat and less fiber. Less acculturated women consumed significantly more fruits and vegetables. Independent of language, US-born women consumed significantly less beans, fruit, whole milk, whole-grain bread, and fruit juice and significantly more bacon or sausage and fried potatoes. Researchers concluded that nativity was a stronger predictor of dietary changes than language.
Montoya et al.,[112] 2011	Adult Mexican Americans 20-65 years old	Random sample in Brownsville, TX and Laredo, TX	Nativity	Dietary intake did not differ between Mexico-born and U.S.-born participants. However, dietary self-efficacy was greater and dietary choices rated as more important by Mexico-born participants. For U.S.-born participants, high dietary self-efficacy was predicted by lower income and higher education.

Study	Population	Sample Design & Location	Acculturation Measure(s)	Key Findings Relevant to the Current Study
Neuhouser et al.,[100] 2004	Adult Hispanic and NHW	Random sample in Yakima Valley, WA	4-item acculturation scale including language most often spoken, language most often used for thought, ethnic self-identification, and birthplace	More acculturated Hispanics consumed significantly less fruit and vegetables and slightly more fat than less acculturated Hispanics. Both Hispanic groups consumed more fruit and vegetables than NHW adults.
Norman et al.,[103] 2004	Adult Hispanic women	Convenience sample	Nativity, years in the U.S., language	Convenience foods and chocolate candy were consumed in significantly greater quantities by U.S.-born women. U.S.-born women who preferred English consumed significantly more convenience foods, salty snacks, and high-fat foods.
Pan et al.,[114] 1999	Asian college students from China, Taiwan, Hong Kong, Japan and Korea aged 18 and older	Convenience sample	Compares pre- and post-migration diets	Average length of stay in the U.S. was 25 months. The participants consumed significantly fewer meals per day since migrating to the U.S. Forty-six percent of respondents skipped breakfast regularly due to school schedules. Frequency of eating meals away from home decreased, possibly due to low income. When students did eat out, they frequently chose American fast foods. Reasons for not preparing traditional foods included preparation time, cost, convenience, cooking skills, and availability. Consumption of fats/sweets, dairy products, and fruits increased significantly and consumption of meat/meat alternatives, and vegetables decreased significantly after immigration. Traditional foods were consumed for traditional festivities such as Lunar New Year. One quarter of respondents reported celebrating Thanksgiving and Christmas, and eating traditional American foods on those occasions. Sixty-two percent of the respondents reported a weight gain of approximately 5 lbs. since immigrating.

Study	Population	Sample Design & Location	Acculturation Measure(s)	Key Findings Relevant to the Current Study
Park et al.,[45] 2003	First generation Korean American mothers and Korean mothers.	Convenience sample in California and Seoul, Korea.	Acculturation scale	The sample was highly educated overall, but more acculturated mothers had higher income and education. Korean American mothers were compared based on acculturation and also compared to native Korean mothers. Consumption of Korean foods was lower and meals away from home were higher for more acculturated mothers. Favorite dishes named by Korean mothers differed from dishes of Korean American mothers; some of the same dishes were named by all groups but differed in order of preference. Highly acculturated Korean American mothers showed less preference for Korean foods. Home preparation of traditional foods, including kimchi, was greater for less acculturated Korean American mothers. However, Korean American mothers prepared significantly fewer Korean dishes at home than Korean mothers regardless of acculturation.
Parsons et al.,[47] 1999	3-year-old children of first and second generation Pakistani mothers	Random sample in Bradford, UK	Generation	Few significant differences were found between the diets of children of first and second generation mothers. Foods that increased significantly with generation were: fish and chips, orange juice, Breakfast cereals, and milk with added sugar. Significantly more children of first generation mothers did not consume breakfast, while more children of second generation mothers did not consume lunch (not significant). Researchers noted some increase in consumption of sugar-sweetened beverages (soda, orange squash, Ribena) with lunch and dinner. Authors further speculate that small differences in dietary patterns may be due to greater employment of second generation mothers, resulting in their increased exposure to British culture. The relative lack of differences may be attributable to the close-knit nature of the Pakistani community.

Study	Population	Sample Design & Location	Acculturation Measure(s)	Key Findings Relevant to the Current Study
Prado et al.,[48] 2006	Hispanic adolescents and their caregivers	Convenience sample in Miami, FL	Nativity and years in the U.S.	Within an ethnic enclave, nativity and years in the U.S. were examined for retention of culture-of-origin practices and adoption of receiving-culture practices. Adoption of receiving-culture practices increased significantly with nativity for adolescents (all caregivers were foreign-born so this could not be tested on older individuals). Authors note that: "boys tended to report high levels of Americanism even after only a small number of years in the United States, whereas for girls, Americanism levels appeared to increase in tandem with greater numbers of years in the United States."
Raj et al.,[15] 1999	Asian Indian adults	Convenience sample in New York and Washington, D.C.	Years in the U.S.	Overall, the majority of participants preferred Indian foods. Women had a greater tendency to snack than men. Consumption of alcohol, juice, and sweet snacks increased with acculturation. Rice remained a staple food for most respondents. More acculturated respondents consumed Indian foods for dinner on weekends and weekdays more often than the less acculturated. Indian snack foods were consumed most frequently on weekends; weekday snacks often consisted of fruit, cookies, milk, crackers, and chips. Consumption of saturated fats, especially butter and the Indian condiment ghee, decreased with acculturation. Researchers speculate that this decrease is due to increased awareness of the negative effects of saturated fats on health.

Study	Population	Sample Design & Location	Acculturation Measure(s)	Key Findings Relevant to the Current Study
Romero-Gwynn and Gwynn,[43] 1997	Mexican American adult women	Sampling method not described. Subjects were from five counties in California.	Generation	On average, women in the sample had low income and education. Differences in dietary intake were found between the two groups, with the second generation group showing more adoption of American foods. Healthy changes included somewhat greater consumption of fruits and vegetables and less use of lard and Mexican cream among second generation immigrants. Unhealthy changes included increased use of fat in salad dressings, mayonnaise, margarine, and cooking oil as well as increased soda consumption rather than traditional fruit-based beverages. Second generation immigrants ate lower amounts of beans and pasta. Consumption of sugary breakfast cereal increased considerably upon immigration, and was consumed slightly more frequently by first generation immigrants. The heaviest meal was consumed in mid-afternoon for first generation immigrants and evening for second generation immigrants. Consumption of traditional foods was inversely correlated with family prevalence of diabetes. Higher occurrences of diabetes and obesity were associated with acculturation.

Study	Population	Sample Design & Location	Acculturation Measure(s)	Key Findings Relevant to the Current Study
Satia-Abouta et al.,[38] 2002	Chinese American and Chinese Canadian adult women aged 20 and older	Random sample in Seattle, WA and Vancouver, Canada	Acculturation scale	For most respondents, it was personally important to consume a low-fat, high fruit and vegetable ("healthy") diet. A slight majority believed a Chinese diet to be healthier than a Western diet. Husbands/partners and older relatives living in the home had preferences for traditional Chinese meals, and these often influenced household food choices. Children usually preferred Western foods and approximately 1/3 influenced household food choices. Younger, more educated women tended to believe there was an association between diet and disease. These women typically preferred a Western diet and did not believe a Chinese diet was healthier. Women working outside the home and those that were younger and more educated were more likely to find traditional meal preparation inconvenient. Only ¼ of women were aware of nutrition-related materials from the government and were significantly younger and more educated.
Singh et al.,[101] 2009	NHW, Black, Hispanic and Asian American children aged 10-17 years	National Survey of Children's Health: random telephone survey across U.S.	Generation, language	Odds of obesity were 26% lower for first generation children after adjusting for numerous confounders, including age, gender, household or parental education, household poverty status, and physical activity. First generation Asian immigrants had 63% and second generation had 37% lower odds of obesity than native-born NHW children. First generation Hispanic children had 34% and second generation had 55% higher odds of obesity than native-born NHW children. However, obesity occurrence did not differ by generation for Hispanic children.

Study	Population	Sample Design & Location	Acculturation Measure(s)	Key Findings Relevant to the Current Study
Unger et al.,[44] 2004	Asian American and Hispanic 6th grade students	Convenience sample in Southern California	Language, US Orientation subscale of the AHIMSA acculturation scale for adolescents, includes information on social preferences, media preferences, food habits, traditions, thinking orientation, and behavioral orientation	Socioeconomic status and parental education were significantly higher for Asian American versus Hispanic students. Hispanic students had significantly higher acculturation scores and consumed fast food significantly more frequently than Asian Americans. After controlling for socioeconomic status and education, acculturation was associated with higher fast food consumption and lower physical activity. English language usage was not associated with fast food consumption or physical activity.
Winham and Florian,[105] 2010	Hispanic adult women in Extension/Expanded Food and Nutrition Program	Convenience sample in Arizona	24-Item Bidimensional Acculturation Scale	Low acculturated women consumed greater quantities of fruits, vegetables, corn tortillas, beans, fruit juice, fats, and oils. Potatoes, French fries, hamburgers, and pizza were consumed more frequently by women of higher acculturation levels.