Exploring the Associations between Family Meal Frequency and Dietary Behaviors in Parents and Youth

by

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ABSTRACT

Objectives. This study primarily explored the relationship between family meal frequency and youth intake of fruits and vegetables (FV) and added sugar from sugar-sweetened beverages (SSBs) in a population of Latinx parents and their middle school children. The study secondarily explored factors influencing family meal frequency; specifically, whether parent education level, income level, acculturation level, and food insecurity are associated with family meal frequency.

Methods. Latinx parents and their 6th-8th grade children were recruited from eligible middle schools in Maricopa County to participate in a larger intervention study. A sample of parent-youth dyads from the first cohort of the larger study was selected for cross-sectional analysis of baseline data in this study (n=124). Participants completed a survey requesting demographics, family meal habits, and dietary intake. Participants were asked to report annual income, education level, and number of family meals in the home in the past week. They were also asked to complete an Acculturation Rating Scale for Mexican Americans, a 6-item Household Food Security Questionnaire, and a 26-question Dietary Screener Questionnaire. Analyses were run using Spearman's Rank Correlation test and a Chi Square test of Independence.

Results. Mean daily youth intake of FV was 2.7 ± 1.4 cup equivalents, and daily youth intake of sugars from SSBs was 8.6 ± 4.9 teaspoon equivalents per day. Fifty percent of parents reported 7 or more family meals per week, while 38.7% reported 3-6 family meals per week and 11.3% reported 2 or fewer family meals per week. There was no

significant association between family meal frequency and youth FV (r=-0.154; p=0.256) or added sugar from SSBs (r=0.027; p=0.807) intake. Similarly, results from Chi Square analyses suggested there was no association between family meal frequency and parent income level (p=0.392), Mexican-oriented acculturation level (p=0.591), Anglo-oriented acculturation level (p=0.052) and food insecurity (p=0.754). In contrast, a significant association between parent education and family meal frequency was found (p=0.014).

Conclusions. Parent education may play a role in shaping family meal practices in Latinx families. More research is needed to further understand this relationship and the relationship between family meal habits and youth dietary intake.

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CHAPTER 1

INTRODUCTION

Latinx individuals now make up the largest minority population in the United States. As of 2017, there were 60 million Latinx individuals living in the U.S., making up about 18% of the total population. According to the U.S. Census Bureau's 2017 population estimates, over 30% of the total population in Maricopa County, the largest municipal county in the state of Arizona, identifies as Hispanic or Latinx (U.S. Census Bureau, 2017).

Statistics from the Centers for Disease Control and Prevention report a prevalence of obesity of 17.5% among children and adolescents (Carroll et al, 2015). Adolescents of Latinx descent suffer even more severely, as the CDC reports that over 80% of Latinx youth are overweight or obese (2016). Given the many costly, disabling, and potentially fatal chronic health conditions associated with obesity, these statistics are concerning on a national, public health level (Kelly et al, 2013). Also concerning is the fact that much research has indicated that overweight and obesity in childhood drastically increases the risk for remaining obese during adulthood (Kelly et al, 2013). Latinx communities in the United States are disproportionately impacted by overweight and obesity, with rates that exceed those of their White, non-Latinx counterparts (Forrest, Leeds, & Ufelle, 2017). Currently, Latinx youth in the United States are experiencing growing rates of overweight and obesity (Steinberger et al, 2016).

Many factors involved in the development of obesity have been identified in the literature, but those most strongly and consistently implicated are lifestyle such as diet

and physical inactivity (Sahoo et al, 2015). Excessive consumption of dietary sugar (especially in the form of sugar-sweetened beverages) has been associated with an increased risk for obesity, particularly when consumed during infancy and childhood (Grimes et al, 2013; Pan et al, 2014). Similarly, inadequate intake of fresh fruits and vegetables is correlated with greater likelihood of obesity during preadolescence (Lee et al, 2011).

One of the key indicators for assessing the overall healthfulness of diet is fruit and vegetable intake. Fruits, vegetables, and other plant foods are rich in fiber, micronutrients, antioxidants, and other health-promoting compounds while being very low in energy (Slavin & Lloyd, 2012). Conversely, intake of added sugars is now being considered another important parameter of diet quality. Higher added sugar intake has been associated with greater risk for developing obesity, cardiovascular disease, and other chronic health problems, and is correlated with reduced diet quality in population-based studies (Kaartinen et al, 2017). The American Heart Association's (AHA) Healthy Diet Score, based on the *U.S. Dietary Guidelines for Americans 2010-2015* and guidelines for the Dietary Approaches to Stop Hypertension (DASH) diet, is based on recommendations to consume 4.5 cups of fruits and vegetables and less than 450 calories (kcals) from added sugars per day (Steinberger et al, 2016). For children and youth specifically, these recommendations are incorporated into the Cardiovascular Health Integrated Lifestyle Diet (CHILD 1) and include age-specific recommendations for eating ample whole grains and limiting sodium (Regis, 2013). Unfortunately, adherence to these recommendations is poor among Latinx adolescents, with only about 30% adhering to

recommendations for added sugars intake and 10% adhering to recommendations for fruits and vegetables intake (Steinberger et al, 2016).

A number of mechanisms are thought to be related to the increased risk of obesity in the Latinx population. Food security, income level, education level, and other socioeconomic factors often play a significant role in health-related outcomes of at-risk populations (Seligman, Laraia, & Kushel, 2010). Food insecurity is defined as a lack of consistent access to safe and nutritious food, and consequently has been observed to lead to a decline in diet quality (Hanson & Connor, 2014). It has been suggested that because energy-dense, nutrient-poor diets are often lower in cost, individuals lower on the income scale are more likely to consume them (Andrieu, Darmon, & Drewnowski, 2006). Some studies have also found education level to be positively associated with diet quality, and individuals in the lowest tiers of education usually have lower diet quality scores when compared with their more educated peers (Hiza et al, 2013). In general, individuals with lower socioeconomic status (including lower education and income level) tend to suffer from adverse health and poor diet quality (Hiza et al, 2013).

Another important factor is acculturation, which is the deviation from the cultural practices of one's country of origin to match those of the dominant culture in a new country (Teske & Raymond, 1974). Studies have found greater levels of acculturation to be associated with poor dietary intake and increased obesity risk in Latinxs (Pérez-Escamilla, 2011). Acculturation in relation to food practices may indicate that Latinx families and individuals are straying away from traditional foods rich in fruits, vegetables, and whole grains in exchange for the high-fat, high-sugar and low micronutrient content of the standard Western diet (Arandia et al, 2018).

Lastly, family dynamics have been found to be an important factor in the dietary and health behaviors of children. Family meals, specifically, are emerging in the literature as potentially protective against harmful dietary habits in both caregivers and youth (Berge et al, 2012). Frequent family meals are notably associated with greater micronutrient intake and lesser saturated and *trans* fat intake among youth and may also be effective for increasing consumption of fresh fruits and vegetables (Gillman et al, 2008). Unfortunately, families with adolescent youth have reported a significantly decreased frequency of family meals during the past 10 years, and the most severe declines have been observed in families of lower sociodemographic standing (Neumark-Sztainer et al, 2013).

Given the increasing rates of obesity and chronic disease in youth populations, and the simultaneous decline in family meal frequency, it is important to better understand the relationship between family meal practices and youth dietary practices. Also given the disproportionate risk for obesity and chronic illness among Latinx individuals, understanding this relationship within Latinx families is especially important.

Study Purpose

The current study is a cross-sectional analysis of a convenience sample of participants enrolled in a study testing a new parenting intervention designed to promote healthy eating and prevent substance use among Latinx families. The primary aim of the present study is to explore whether the frequency of family meals is associated with fruit/vegetable and sugar-sweetened beverages intake in youth and/or their parents. The

secondary aim is to explore whether sociodemographic factors are associated with frequency of family meals.

Research Aims and Hypotheses

- **Research Aim 1:** To determine the association between family meal frequency and intake of fruits, vegetables, and sugar-sweetened beverages.
- ***Research question:*** Is the frequency of family meals associated with intakes of fruits and vegetables (FV), and added sugars from sugar-sweetened beverages (SSBs) by youth?
- **H1:** Greater frequency of family meals will be associated with higher reported intakes of FV by youth.
- **H2:** Greater frequency of family meals will be associated with lower reported intakes of SSB by youth.

- **Research Aim 2:** To explore whether sociodemographic factors (i.e., education, acculturation, food insecurity, income) are associated with family meal frequency.
- ***Research question:*** Are sociodemographic factors (i.e., education, acculturation, food insecurity, income) associated with family meal frequency in the home?
- **H1:** Lower education level will be associated with lower frequency of family meals in the home.

- **H2:** Greater acculturation level will be associated with lower frequency of family meals in the home.
- **H3:** Lower food security will be associated with lower frequency of family meals in the home.
- **H4:** Lower income level will be associated with lower frequency of family meals in the home.

Definition of Terms

Acculturation: The process of modifying one's own native cultural beliefs and practices by borrowing or adapting to the components of another culture (Arandia et al, 2018)**.**

Adolescents: Generally, used to refer to youth between 10 to 19 years of age.

Food security: Describes the ability to consistently access safe, fresh, and nutritious foods (may refer to ability to purchase foods, prepare foods, or store foods safely)

Family meals: Defined in most studies as the occurrence of all or most of the household eating a meal together.

Latinx: A person who has origins in Latin America, e.g. Mexico, Cuba, Puerto Rico, Argentina, Venezuela, and other Latin American countries.

Obesity: Defined as having a calculated body mass index greater than 30 kg/m^2.

Overweight: Defined as having a calculated body mass index between 25 to 29.99 kg/m^2.

Sugar-sweetened beverages (SSBs): Beverages made with additional sugar during the preparation/manufacturing process; including but not limited to soda pop, fruit drinks, sports drinks, and energy drinks. Does not include 100% fruit juices.

CHAPTER 2

THE REVIEW OF LITERATURE

Latinx Populations in the United States: National and State Health Statistics

Latinx communities living in the United States comprise a diverse, dynamic, and vulnerable population. Much research demonstrates that this group endures a vast array of unique challenges related to socioeconomic status and health. Data from the Centers for Disease Control and Prevention reports that over 21% of Latinx individuals within the United States live below the poverty line and a staggering 81.3% of Latinxs are considered overweight or obese (CDC, 2016). A study of Latinx adults from various cultural backgrounds found that women of Puerto-Rican descent reported having more risk factors for cardiovascular disease than those of other backgrounds, while men and women of Mexican descent reported more risk factors for diabetes (Daviglus et al, 2012).

In Maricopa County, the largest municipal county in Arizona, over 30% of the population identifies as Hispanic or Latinx (U.S. Census Bureau, 2017). This population suffers disproportionately from chronic diseases and other health complications. According to the Maricopa County Department of Public Health's status report for the year 2016, 34.8% of the Latinx population was considered to have obesity compared to 25.9% of the White, non-Latinx population (2016). Additionally, 11.1% of the Latinx population was found to have been diagnosed with both types of diabetes compared to 9.9% of the White population (Maricopa County Department of Public Health, 2016). Given the great disparity in health status between Latinx and non-Latinx individuals, research to identify effective solutions to end this disparity is needed.

Chronic Disease Risk Factors

A number of metabolic conditions have been implicated in the development of chronic disease. One such condition is hypertension, or high blood pressure, defined in adults as blood pressure consistently reading above 130/80 mm Hg and in children as blood pressure measuring over the 95th percentile for weight and age (AHA, 2010). Chronic hypertension damages arterial walls and reduces their integrity, increasing the risk for heart attack and stroke (Poulter, Prabhakaran, & Caulfield, 2015). Nutrition is well-documented to play an important role in preventing and managing hypertension; both dietary sodium reduction and adoption of the DASH diet have been associated with significant reductions in blood pressure (Juraschek et al, 2017).

Hyperglycemia, or elevated blood glucose, is also a prominent risk factor for chronic disease development. Elevated serum glucose has been demonstrated to induce systemic inflammation and cellular damage via phagocytic immune response (Bulavintseva et al, 2016). Hyperglycemia that is chronic is termed diabetes mellitus; nutritional management of diabetes includes practices such as carbohydrate counting and insulin administration, if indicated (Feinglos et al, 2008). Complications of long-term, uncontrolled diabetes include vascular conditions, kidney disease, heart attack, and stroke (Papatheodorou et al, 2018).

Obesity is another risk factor for chronic diseases. Obesity is defined as having excessive adipose tissue. The presence of obesity, especially central or abdominal obesity, has been implicated in many inflammatory conditions including cardiovascular disease (CVD) and diabetes (Sahoo et al, 2015). CVD describes dysfunction of the cardiovascular system, commonly due to chronic inflammation (Mozaffarian et al, 2015).

Obesity in childhood is considered by many experts to be an important predictor of health outcomes in adulthood. Perhaps most significantly, the presence of obesity in childhood has been found to increase the risk of becoming or remaining obese in adulthood, and over half of overweight and obese adults were found to have been overweight or obese as children (Biro & Wien, 2010). Childhood obesity may have many other physical health consequences for the child, including increased risk for asthma, obstructive sleep apnea, Type 2 diabetes mellitus, and fatty liver disease (Sahoo et al, 2015).

The Impact of Obesity on Health

While *obesity* has been described in a number of ways, it is most often defined in the medical literature as having an excess of body fat (Sahoo et al, 2015). Obesity has been identified as a risk factor for numerous diseases and health detriments throughout the medical literature and considered to have profound impacts on mental and physical health and longevity. Two well-documented possible complications of obesity are cardiovascular disease and cancer.

Additionally, childhood obesity may have profound and lasting consequences on mental health extending into adulthood. Obesity in adolescents, particularly, has been associated with lower self-esteem, negative self-image, and a mental preoccupation with weight that may precipitate the development of disordered eating (Dietz, 1998). Obesity in childhood and adolescence has also been investigated as a strong independent risk factor for depression in adults (Sánchez-Villega et al, 2013).

Nutrition as Etiology of Obesity

Genetics, environmental factors, and behavioral factors are commonly identified as the three primary domains within which the etiologies of obesity lie (Sahoo et al, 2015). While genetics play an important and poorly understood role in susceptibility to and development of obesity, they are believed to account for as little as 5% of the risk for developing obesity, with other factors such as sedentary behavior and the changing food environment playing much larger roles (Sahoo et al, 2015). This changing food environment describes the wide availability of inexpensive and easily obtained so-called "fast foods" that are characteristically energy-dense and nutrient-poor (Sahoo et al, 2015).

Major Chronic Diseases Affecting Latinxs

Type 2 Diabetes

A particularly prominent chronic illness increasingly affecting Latinx adolescents is type 2 diabetes. Type 2 diabetes is a metabolic disorder characterized by persistently elevated serum glucose values secondary to cellular insulin resistance and pancreatic beta cell dysfunction (Kahn, Cooper, & Del Prato, 2014). Diabetes is a condition with multisystem involvement, over time leading to damage and inflammation in the blood vessels of the eyes, heart, and kidneys (Kahn et al, 2014). This damage is more likely to occur when blood glucose control which may be achieved with dietary measures and with or without insulin administration, is inadequate (Kahn et al, 2014).

Once thought to be an exclusively adult experience, type 2 diabetes is being diagnosed in youth at an increasingly alarming rate and disproportionately among

Latinxs. Findings from the SEARCH for Diabetes in Youth study indicate that while type 2 diabetes in youth remains low in the United States (at 0.046 per cent), its incidence has increased over 30% in the last twenty years and affects 0.079 per cent of Latinx adolescents compared with 0.017 per cent of their non-Hispanic white counterparts (Debelea et al, 2014). Of concern, one study found that more than one third of sampled youth with type 1 or type 2 diabetes had poor glycemic control, leaving them at risk for developing serious complications (Lawrence et al, 2009).

Some studies have found that Latinx individuals experience greater non-alcoholic fatty liver disease, characterized by the accumulation of fat in the liver, which is associated with reduced insulin sensitivity and potentially contributes to development of type 2 diabetes (Cruz & Granados, 2019). Given this high prevalence of diabetes in Latinx individuals, and especially in youth, it is clear that effective preventive interventions are needed for this population.

Cardiovascular Disease

A variety of cardiovascular abnormalities comprise CVD, including hypertension, arteriosclerosis, stroke, heart attack, and heart failure (Mozaffarian et al, 2015). CVD is currently the leading cause of death in the United States (CDC, 2017). CVD is believed to arise from endothelial dysfunction induced by dyslipidemia, hypoglycemia, and systemic inflammation, each of which has been associated with excessive body fat (Lavie, Milani, & Ventura, 2009). One particularly significant CVD event strongly correlated with obesity is myocardial infarction, also known as a heart attack, which describes the often-fatal interruption of blood flow to the heart (Lavie et al, 2009).

It is estimated that over 86 million, or 1 in 3, adults in the United States has at least one type of CVD (Mozaffarian et al, 2015). According to a report by the AHA, 49% of Latinx males and 42.6% of Latinx females 20 years of age and older had CVD in 2013-2016 (Benjamin et al, 2019). Despite the lower prevalence relative to other ethnic groups, it has been reported that hospitalization rates among Latinx individuals with CVD were higher than that of their non-Hispanic black or white counterparts (Balfour et al, 2016). In addition, surveys conducted by the CDC found that Latinx individuals were less likely to be aware of the warning signs of CVD including heart attacks (2008). These findings indicate an urgent need for prevention and education in the Latinx community.

Cancer

Cancer is the second leading cause of death, behind CVD, and its incidence is rapidly increasing in the developed world (CDC, 2017). *Cancer* describes the presence of abnormal cells that multiply in an uncontrolled manner and infiltrate healthy tissues, leading to the development of cellular masses and growths that are often devastating to health and normal function (Cooper, 2001). A population-based cohort study of over 5 million adults in the United Kingdom found that obesity was a significant risk factor for the development of many types of cancer, including cancers of the kidneys, breast, liver, and endometrium (Bhaskaran et al, 2014).

A number of demographic studies have found that non-White Latinxs experience lower overall incidence of cancer and associated mortality compared with their White, non-Hispanic counterparts (Howe et al, 2006). However, a retrospective case-control study assessing 1.2 million cancer deaths between 1993-2005 found that non-White

Latinx individuals with moderate-risk cancer were more likely to die after follow-up, with U.S.-born Mexicans at a 13% greater mortality risk and foreign-born Mexicans at a 24% greater mortality risk compared to non-Hispanic Whites with the same cancer (Pinheiro et al, 2011). It is not clear what the reason for this disparity might be, though it may be partly influenced by Latinx individuals' income, health literacy, citizenship status, geographic location, and other social determinants of health (Vega, Rodriquez, & Guskin, 2009).

Prevention of Chronic Disease

While a number of lifestyle behaviors elevate risk for diseases, many behaviors are also important for reducing this risk, especially when implemented at an early age. More research is emerging demonstrating that lifestyle interventions taking place during early developmental phases of the lifespan (such as early childhood and adolescence) may impact long-term risk to a much greater extent than interventions made during adulthood (Hanson & Gluckman, 2011). Other studies have determined that lifestyle intervention efforts in at-risk adolescents are effective for reducing risk of onset of Type 2 diabetes (Soltero et al, 2018). A systematic review of multiple studies found that both dietary energy intake and physical activity behaviors track well into adulthood, including maladaptive behaviors such as excess energy intake and inadequate fruits and vegetables intake (Craigie et al, 2011). However, these studies were largely conducted in European populations, and evidence to describe the tracking of health behaviors through the lifespan in Latinxs is missing.

The Research Problem: Health and Dietary Behaviors in Latinx Adolescents

Among adolescent Hispanics and Latinxs, a disproportionate number of risky health behaviors are often present. According to the CDC's Youth Risk Behavior Survey, Latinx high school students, both males and females, were found to be more likely to participate in risky health behaviors such as binge drinking alcohol (Kann et al, 2018). In the same survey, Hispanic students were also among the most likely to be sedentary and fail to consume recommended amounts of fruits and vegetables (Kann et al, 2018). The CDC has reported that in 2017 15.6% and 14.8% of Hispanic and Latinx adolescents nationwide were overweight and obese, respectively, in 2017 (Kann et al, 2018).

Studies assessing the diets of Latinx adolescents typically find that they are rich in energy, added sugars, and saturated fat and poor in essential nutrients (Wilson et al, 2009). Some studies have found this to be a trend as adolescents become acculturated, but another study found these dietary behaviors similar between Latino youth in the United States and in Mexico (Pérez-Escamilla, 2010; Barquera et al, 2008). Given this current data on the susceptibility of Latinx individuals for developing many chronic diseases, these prevalent risky health behaviors are significant and interventions to address the health behaviors of this population are needed.

The Impact of Fruit, Vegetable, and Added Sugar Intake on Health

The 2015-2020 *U.S. Dietary Guidelines for Americans* recommends an overall daily consumption of 4.5 cups of fruits and vegetables for individuals consuming 2,000 kilocalories (kcal) per day and intake of less than 450 kcals from added sugars per day (U.S. Department of Health and Human Services and U.S. Department of Agriculture,

2015). Unfortunately, adherence to these recommendations is poor among Latinx adolescents: specifically, only about 30% of Mexican American adolescents aged 12-19 years were found to follow the recommendations for added sugars intake, and just 10% currently follow recommendations for fruits and vegetables intake (Steinberger et al, 2016). While the impact of dietary habits on health is clear, adherence to recommended guidelines among adolescents remains poor.

Fruits and Vegetables

A key indicator for assessing the overall healthfulness of diet is fruit and vegetable intake. Fruits, vegetables, and other plant foods are rich in micronutrients, antioxidants, and other health-promoting compounds while being very low in energy (Aune et al, 2017). Adequate fruit and vegetable intake is strongly associated with decreased cardiovascular disease risk, cancer risk, and all-cause mortality risk in adults (Aune et al, 2017). Intakes of fruits and vegetables may also be protective against overweight and obesity via improved satiety and as a nutritionally-dense food that may replace more energy-dense foods in the diet, although the exact relationship between fruits and vegetables intake and obesity is still largely unknown (Rebello et al, 2013; Rolls, Martin, & Tohill, 2004).

A number of barriers to adequate fruit and vegetable intake exist. Lack of knowledge about the importance of fruits and vegetables in the diet, lack of time or skill to prepare and/or cook these foods, and inability to obtain fresh produce due to food insecurity are just a few of the innumerable variables impacting adequate fruit and vegetable intake (Ternier, 2010; Pem & Jeewon, 2015). Efforts to increase fruit and

vegetable consumption among at-risk populations that have demonstrated relative success include community education programs and produce "vouchers" to promote purchasing and consumption of fresh produce (Wagner et al, 2016; Bihan et al, 2011).

Studies have found that fruit and vegetable intake among Latinxs fails to meet recommendations. According to a study using data from the National Health and Nutrition Examination Survey, Latinx individuals consumed an average of 0.78 cup equivalents of fruits and 1.33 cup equivalents of vegetables per day, which falls below the recommended 4.5 cups of fruits and vegetables per day (NHANES; USDA & HHS, 2015; Moore et al, 2015). Among Latinx youth ages 12-19, fewer than 10% are meeting the recommended daily intake of fruits and vegetables (Steinberger et al, 2016). Given the clear risk reduction with adequate fruit and vegetable intake, such poor adherence to fruit and vegetable recommendations could be predictive of greater chronic disease risk in this population.

Added Sugars

Added sugars are sugars not found naturally in foods but added during the preparation process (Popkin & Nielson, 2003). Added sugar consumption is another important parameter of diet, as higher added sugar intake is associated with greater risk for developing obesity, CVD, and other chronic health problems (Malik et al, 2010). Added sugar acts as an additional source of energy without providing meaningful amounts of essential micronutrients or fiber, and there is also some evidence to suggest that excessive consumption of added sugar, and especially sources including fructose, may produce a disruption to metabolic pathways in the liver that lead to elevated low-

density lipoprotein levels in the blood and a resulting increased risk for developing CVD (Yang et al, 2014). Excessive added sugar intake has also been implicated in the development of Type 2 diabetes, via metabolic changes occurring through hepatic absorption of fructose (Allister & Stanhope, 2016).

A component of added sugar intake that is often targeted in interventions is consumption of sugar-sweetened beverages (SSBs). Studies examining the most common sources of added sugar in the diet have concluded that SSBs, most notably soda pop and other carbonated sweetened beverages, make up the majority of added sugar sources, with one systematic review finding that they accounted for over 30 percent of the added sugar intake of U.S. adults (Hu, 2013). The same review found that efforts to promote healthier alternatives to SSBs were effective for reducing caloric intake and increasing satiety, leading to an overall decrease in average calorie intake (Hu, 2013).

Current sugar intakes among Latinx Americans are not consistent with recommendations. According to data from *What We Eat In America*, Hispanic individuals aged 12 and older consume more than 100 g total sugars per day (USDA ARS, 2019). Interestingly, Latinx males aged 14-50 years of age reported consuming the most total sugars at 128 g per day (USDA ARS, 2019). Given the associations between added sugars and chronic diseases, excessive intake of added sugar is an important health concern among Latinx communities that needs to be addressed with appropriate interventions.

Influences on Dietary Behaviors in Children and Adolescents

A multitude of influences exist that shape the eating behaviors and preferences of children and adolescents throughout their development. Food access, school and social environment, assimilation and acculturation, and family influences are among the most impactful factors in shaping dietary behaviors and are explored below.

Food Security

Food security is a measure of the ease and ability of an individual or family to access safe and healthy food (Hodson, 2017). Impediments to food security, which include a low socioeconomic status, lack of transportation, natural disaster, and geographic distance from grocery stores and other vendors that provide fresh produce, may become pervasive and lead to food *insecurity,* in which access to safe and nutritious foods may be limited and unpredictable (Widome et al, 2009). Data from the USDA Economic Resource Service found that Latinx households are twice as likely as White, non-Hispanic households to experience food insecurity (Coleman-Jensen et al, 2019).

Numerous studies have demonstrated a tangible effect of food insecurity on the dietary behaviors of individuals, particularly children; for example, Albar et al (2015) observed that children who endured an extensive period of inadequate food access were more likely to overeat once food became available. Importantly, food insecurity may not only affect the quantity of food that children consume, but also the quality and nutrient density of the food. In one survey study, children in food-insecure households who were asked for their perceptions of healthy eating responded with sentiments that eating healthy foods was considered an "inconvenience" in their households (Widome et al,

2009). Lastly, in a study focusing on Mexican-American mothers and their children's intake in response to parenting practices and maternal pressure to eat, researchers found that mothers from food insecure households believed that the quality of food provided for their children was reflected by the quantity, and thus may be more likely to encourage their children to eat excessively (Matheson et al, 2006).

School Environment

The school environment is another important influence for shaping diet habits in children. Generally, studies have found that younger children in 5th grade or below benefit the most nutritionally from consuming school lunches regularly (Au et al, 2016). In one study of low-resource public elementary schools in California, in which >50% of students qualified for free- or reduced-priced school lunch, it was found that elementary school children (4th and 5th grade) who ate school lunch measured a higher diet quality score, with the Dietary Guidelines for Americans as the reference, compared with children who ate lunch brought from home (HHS & USDA, 2015; Au et al, 2016). However, this also largely depends on the extent to which the provided lunches satisfy the Dietary Guidelines (HHS & USDA, 2015; Aun et al, 2016).

School environments may also play an important role in shaping adolescent eating behaviors. Studies have found that the availability of particular foods within the school are directly associated with frequency of intake of those foods outside of school, while the inclusion of physical education classes into the curriculum promotes increases physical activity outside of school (Story, Nanney, & Schwarts, 2009; Mobley et al,

2012). The school environment, then, may be an important modifiable factor in the development of beneficial eating and lifestyle habits in children.

Social Environment

A small number of studies have also assessed the role of peer influence and social environment on health behavior in adolescents, finding that the diet and physical activity behaviors of adolescents were closely associated with those of their peers, although this association is heavily influenced by gender and closeness of the relationship (Chung, Ersig, & McCarthy, 2017). However, this relationship has not been studied extensively enough to inform possible interventions targeting social influences on health behaviors in adolescents (Chung, Ersig, & McCarthy, 2017).

Media and Marketing

Much research suggests that children of all ages are influenced by media marketing to some extent. In one study, pre-adolescent boys (5^{th} and 6^{th} grade) who were shown sports celebrity endorsements of products were found more likely to purchase and consume energy-dense, nutrient-poor food items after viewing (Dixon et al, 2014). Similarly, the presence of fictional, cartoon-based characters and mascots on food packaging often encourage children to choose calorie-dense and nutrient-poor foods like cookies and candy (Kraak & Story, 2015). However, researchers are also optimistic that alternative uses of cartoon mascot marketing may have the potential for promoting fresh fruit and vegetable intake in children as well (Kraak & Story, 2015). Insufficient research

exists, however, to assess the impact of marketing on food choices in older children and adolescents.

Acculturation

Acculturation describes the process of modifying one's own native cultural beliefs and practices by borrowing or adapting to the components of another culture; similarly, assimilation refers to the taking on of traits resembling the dominant culture of the country in which they reside, often to the extent that their cultural beliefs and practices are nearly indistinguishable from those of the dominant culture (Teske & Raymond, 1974)**.**

In Latinx-Americans, acculturation and assimilation to the dominant culture of the United States has resulted in significant impacts to many cultural ways of life, including dietary habits. A review and qualitative analysis by Arandia et al (2018) found that these changes in Latinx older adults manifested as a deviation from traditional dishes rich in plant foods and a drastic reduction in variety of the diet. The older adults surveyed stated that their children were more likely to prefer American foods over traditional foods (Arandia et al, 2018a). In another study by the same authors specifically looking at acculturation effects in Latino adolescents, a significant decrease in diet quality of more acculturated youth was observed (Arandia et al, 2018b). In general, the higher the subjective acculturation score, the lower the diversity and nutrient density of the diet (Pérez-Escamilla, 2011; Park et al, 2016).

Other studies have demonstrated that certain characteristics of acculturation in Latinxs (such as predominantly speaking English over Spanish) were negatively

associated with consumption of fresh fruits and vegetables and positively associated with consumption of sugar-sweetened beverages (Pérez-Escamilla, 2011; Park et al, 2016). This may be, in part, due to perceptions of United States immigrants from countries such as Mexico that fresh fruits and vegetables were more readily available in their home countries (Ayala, Baquero, & Klinger, 2008). As Latinx American communities continue to integrate into the United States culture, it remains important to identify how acculturation impacts their physical health and address these impacts with appropriate interventions.

Family and the Home Food Environment

Families may exert strong influences on the eating behaviors of children by shaping the food environment in which they live. The concept of the "home food environment" describes how the combination of a child's home social environment (parenting styles, parent modeling, and family meal practices) and the availability of foods and beverages in the home influences that child's dietary choices (Watts et al, 2018). Certain styles of parenting have been associated with child diet patterns; permissive parenting, for example, has been associated with a lower Dietary Approaches to Stop Hypertension (DASH) diet score in adolescents, indicating lower diet quality (Couch et al, 2014). Studies have found that parent modeling of fruit and vegetable intake significantly increase fruit and vegetable consumption among children (Pearson et al, 2009). A major component of the family and home food environment that may profoundly influence child eating behaviors, and discussed here, is family meals.

Family Meal Dynamics

The nature and structure of family meals has been well studied across cultural and ethnic contexts; however, their exact consequences have not been thoroughly explored. There is consistency in much of the literature about how family-level factors may play one of the greatest roles in shaping the behaviors, attitudes, and health of adolescent youth (Erlich et al, 2012; Jones et al, 2018) This may be especially true for health behaviors. Some research has suggested that family meals may be effective for promoting intake of fruits and vegetables at mealtimes (Christian et al, 2013; Draxten et al, 2014). There is also evidence to suggest that regular family meals may be protective against early childhood obesity (Berge et al, 2015; Chan & Sobal, 2011).

An analysis of data from the Nurse's Health Study II, which measured self-reported intakes and dietary practices of over 1,500 children aged 9-14 years, found that more frequent family dinners was associated with a slightly greater energy intake, but also markedly greater micronutrient intake and lesser intake of saturated and trans fats (Gilman et al, 2008). Similarly, the composition of family meals (i.e. which foods are served at mealtimes) and parent diet modeling of healthy dietary behaviors may influence the dietary habits of children even when they are away from home by encouraging greater fruit and vegetable intake and decreasing sugar-sweetened beverage intake (Draxten et al, 2014). These relationships between dietary intake and family meals hold especially true for adolescents (Neumark-Sztainer et al, 2003; Videon & Manning, 2003). Frequent family meals are also negatively associated with dietary restriction and eating concerns in adolescents with eating disorders, particularly those diagnosed with bulimia nervosa (Elran-Barak et al, 2014).

Few studies have specifically examined the nature of family meal habits in Latinx Americans. Additionally, no studies to date have examined the relationship between family meal frequency and fruit and vegetable intake specifically in Latinx adolescents.

Factors Affecting Frequency and Composition of Family Meals

A few studies have assessed family meal frequency, and one study found food secure youth to be more likely to report frequent family meals (Bruening et al, 2012; Widome et al, 2009). Other studies have assessed composition of family meals (that is, the particular foods served at the meal), finding food insecure households offer SSBs more frequently than food secure households (Bruening et al, 2012; Story et al, 2003). Despite the research that exists regarding family meal frequency and composition, no validated tools for measuring and evaluating these were found in the literature.

Family Behaviors

Certain behaviors within the home have been attributed to family meal frequency. A study comparing households with frequent and infrequent family meal times observed that so-called "picky eating" among children was more often reported by households with infrequent family meals (Berge et al, 2018). Studies have found that mothers are the member of the family unit most responsible for planning, coordinating, and managing family meal times and have an overall positive effect on family meal dynamics; thus, lower self-efficacy for meal planning in mothers might negatively impact family meal frequency (Trofholz, Schulte, & Berge, 2018). Other studies have shown that family cohesion, or the emotional bonding between family members, may act as a mediating

factor on the relationship between frequent family meals and dietary intake of the family (Welsh et al, 2011).

The use of electronic media is a behavior that has been shown to impact communication between family members and use during mealtimes can affect both communication and the quality of the meal. One study found that having the television on during family meals, even as mere background noise, was negatively associated with the healthfulness of food served during those meals (Trofholz et al, 2017). Another study determined that cell phone use during meals negatively impacted communication between family members during the meal (Fulkerson et al, 2014). It is not entirely clear why these associations exist, but researchers believe it may be due to television contributing to a chaotic environment (Trofholz et al, 2017). Media use during family meals has not been examined specifically in Latinx individuals.

Income

Studies have demonstrated that family meal frequency among youth is positively associated with family socioeconomic status (SES; Neumark-Sztainer et al, 2003). Income level and SES are also strongly predictive of diet quality, as numerous studies confirm that low SES is associated with intake of energy-dense and nutrient-poor foods (Drewnowski, A., & Eichelsdoerfer, 2010). Research in Latinx individuals has found that those with a *higher* income are actually more likely to consume foods away from the home, which itself is associated with a lower diet quality (McClain et al, 2018). Little research otherwise exists comparing the dietary habits of lower-income Latinx families with those of higher-income Latinx families.

Food Insecurity

Food insecurity may have a profound impact on the frequency and composition of family meals. Namely, food insecurity is negatively associated with offering fruits and vegetables with meals and positively associated with offering sugar-sweetened beverages at meals (Boutelle et al, 2007). Food insecurity is also linked to a perceived lack of time by caregivers to prepare meals, which may discourage meal preparation and therefore family meals in the home (Ternier, 2010). Available research specifically in Latinx families and individuals has not found an association between food insecurity and diet quality (Pérez-Escamilla et al, 2009). However, the lack of an association may be due to the relative lack of studies regarding food insecurity and diet quality in Latinx populations.

Summary

In summary, it is clear that the eating behaviors of children and adolescents are influenced by a number of factors including food access, school and social environment, media, acculturation, and family dynamics, especially parenting practices and the home food environment. Additionally, adolescents and particularly Latinx adolescents are susceptible to risky health behaviors and poor dietary habits, and consequently at an increased risk of certain health issues. At the same time, family meal times have been shown to be a protective factor against chronic disease and overweight in children and may positively impact the diet quality of both youth and parents. It is important to further understand the relationship between family meals and diet behaviors and identify factors

affecting family meal dynamics so that effective interventions to encourage and improve family meals may be explored and created.

CHAPTER 3

METHODOLOGY

Study Design

The proposed study is a secondary data analysis of the Families Preparing the New Generation Plus (FPNG+) study conducted at Arizona State University (Vega-López et al, 2019). The primary study is an ongoing randomized-controlled trial comparing the effects of three 10-week parenting interventions on youth dietary habits and substance use. The three interventions were as follows: 10-week parenting classes delivering the FPNG+ curriculum (with additional nutrition topics discussed), 8-week classes offering the original FPNG curriculum (without the additional nutrition education), and 8-week classes offering the curriculum Realizing the American Dream, a program created by the ASU American Dream Academy and designed to prepare adolescents for success in college. The present study will consist of a cross-sectional analysis of baseline data from 124 parent-youth dyads. For purposes of this thesis, the randomized controlled trial design will not be described.

IRB approval and written consent. This study was approved by Arizona State University's Institutional Review Board for the Social Behavioral Sciences on October 17th, 2018 (STUDY00006797, Appendix A). All adults provided written consent to complete the survey (Appendix B). All youth provided written assent to complete the survey after their parents had given permission for them to participate as well (Appendices C and D).

School selection. Specific selection criteria were used to determine schools eligible to participate in the study. A school was considered eligible to participate if it: 1) is located in Maricopa County; 2) is a public school offering grades 6, 7, and 8, with at least 65 students in each grade level; 3) has a student enrollment consisting of at least 60% Latinx students; 4) receives Title I funds from the federal government for educational needs; and 5) is willing to offer one of the 3 programs to students' parents on-site.

Participants

Participants included in this study were originally recruited for the randomized-controlled trial study. Eligibility criteria for parents included being the parent of an eligible youth and being at least 18 years of age. Eligible youth were those between the ages of 11-14 years and in the 6^{th}, 7^{th}, or 8^{th}-grade level.

Recruitment. Participants were recruited via distribution of flyers at the participating school to children attending the middle school classes. A total of 184 parents consented to be part of the study and completed the pre-surveys; 126 recruited parents gave consent for their youth to participate, and 126 youth assented to participate.

Measures

Survey. Parents and youth each completed a survey administered via Lenovo tablets (Beijing, China) using the Qualtrics platform (Provo, Utah, United States). Surveys were available in English or Spanish, and participants responded to surveys in their language of preference. Staff assistance for survey completion was available to participants who

requested it. The survey asked questions regarding family characteristics, personal beliefs and values, cultural experiences, and family meal dynamics. For purposes of this study, only the survey instruments relevant to the constructs for the current analysis will be described below (Appendices E and F).

Intake of Fruit, Vegetables, and Sugar-Sweetened Beverages (dependent variables). Dietary intake was assessed using the 26-item dietary screener questionnaire (DSQ) asking respondents about their usual intake of select food groups (Thompson et al, 2017). The DSQ is a population-focused measure developed by the National Cancer Institute (NCI) that captures mean intakes of fruits and vegetables, dairy, whole grains, red meat, processed meat, and added sugars as well as nutrients such as calcium and fiber (Thompson et al, 2017). The DSQ is able to estimate actual intake using reported frequencies from surveillance data, unlike food frequency questionnaires, and has been found to correlate well with more exhaustive measures such as 24-hour dietary recalls (Thompson et al, 2018).

Questions are framed such that they ask for the number of servings of food (or times a respondent consumes that food) and the frequency (per day, week, or month) with which they consume that number of servings. Questions from the DSQ are identical for both the parent and youth surveys. For the statistical analysis, cup equivalents of fruits and vegetables intake and teaspoon equivalents of added sugars from SSB intake were used.

Family meals (dependent/independent variable). One question about family meal frequency was included in the parent survey and asks, "During the past week, how many times did all, or most, of your family living in your household eat a meal together?", with options ranging from "Never" to "More than 7 times" (Appendix D).

Education and income (independent variables). Questions in the parent survey were asked to measure respondents' education and income level (Appendix E). Parents were asked, "What is your best estimate of your household's total annual income?"; options were "less than $10,000"; "$10,000-$14,999"; "$15,000-$19,999"; "$20,000-$24,999"; "$25,000-$29,999"; "$30,000-$49,999"; "$50,000-$74,999"; and "greater than $75,000" annually.

Parents were also asked, "What is the highest grade of education you have completed?"; options included "did not complete high school", "received a high school diploma", "attended or graduated from trade school", "attended or graduated from two-year junior or community college", "attended or graduated from four-year college or university", and "earned a post-graduate degree (e.g. master's degree, law school)".

Acculturation status (independent variable). An acculturation-rating scale from Cuellar et al (1995), the Acculturation Rating Scale for Mexican Americans (ARSMA) asks a series of scale-type questions to measure respondent level of acculturation and is targeted to Latinx individuals. Statements regarding English and Spanish language use, preference for English or Spanish media, and personal beliefs about culture were included in the ARSMA. The ARSMA was included in both the parent and youth surveys

(see Appendices E and F). For the purpose of analysis, the Anglo-Oriented Scale (AOS) for parent participants was calculated and represents Anglo orientation, or acculturation, and is scored from 1-5, with 1 representing the lowest Anglo-oriented acculturation and 5 representing the highest degree of acculturation. The Mexican-Oriented Scale (MOS) was also calculated for parent participants, representing Mexican cultural orientation and scored from 1-5, with 1 representing the lowest degree and 5 representing the highest degree of Mexican orientation. These two scales were analyzed separately.

Food insecurity (independent variable). The 6-item Household Food Security scale was included in the parent survey (Bloomberg et al, 1999; Appendix E). The first two questions are the statements, "The food that we bought just didn't last, and we didn't have money to get more", and "We couldn't afford to eat balanced meals", and participants were prompted to respond whether those statements were "often true", "sometimes true", or "never true" in the last 12 months. If participants responded, "sometimes true" or "often true", these questions were scored 1 point each. The next question after these asks "In the last 12 months... did you or other adults in your household ever cut the size of your meals or skip meals because there wasn't enough money for food?" if participants responded "'yes, almost every month' and 'yes, some months but not every month', this question was scored 2 points, and if they responded "yes, only 1 or 2 months" then this question was scored 1 point. Another scenario-based question asks, "...did you ever eat less than you felt you should because there wasn't enough money for food?" and an answer of "yes" was assigned 1 point The last question

asks, "...were you ever hungry but didn't eat because there was not enough money for food?", and if participants respond "yes", they are assigned 1 point for this question.

Scores for each question were added up to yield the Food Insecurity score. Food insecurity was measured on a scale from 0-6, with a higher value indicating greater food insecurity. Scores of 0-1 were considered high or marginal food security, scores of 2-4 low food security, and scores of 5-6 very low food security (USDA, 2012). For this study, due to a low number of participants reporting low or very low food security, participants were categorized as "food secure" (score of 0-1) or "food insecure" (score of 2-6).

Statistical Analysis

Statistical analyses were conducted using the Statistical Package for the Social Sciences (SPSS, IBM, 2013) software, version 25.

First, parent and youth data were matched, and all unmatched parent and youth data points were excluded. Parents and students who did not self-report as a Latinx ethnicity were also removed from the analysis, leaving a total of 124 matched parents and youth. Next, estimated frequencies of youth-reported intake collected through the DSQ were converted to estimated actual intakes using an algorithm developed by the NCI (Thompson et al, 2017).

For the statistical analysis, responses about family meal frequency were grouped into the categories: "2 or fewer times per week", "3-6 times per week", and "7 or more times per week". Due to <25% respondents reporting greater than a high school diploma, all education responses beyond high school diploma (technical or trade school, 2-year

college, 4-year college, and post-graduate) were collated into one category, and all responses of high school education or less were collapsed into another category for a total of two categories ("less than high school" and "high school or greater") for analysis. Income responses were grouped into two categories relative to the federal poverty line for a family of four (HHS Office of the Assistant Secretary for Planning and Evaluation, 2019): less than $25,000 or $25,000 or more.

Associations between ordinal variables (family meal frequency and acculturation level) and ratio/interval variables (youth FV and SSB intake) were assessed using Spearman's rank correlations. Associations were considered significant at $p<0.05$. Parent participant data and youth data were matched prior to all analyses.

A Chi square test of independence was conducted to assess for bivariate associations between parent education level and family meal frequency; food insecurity and family meal frequency; and acculturation level and family meal frequency. The Pearson Chi Square statistic was used to check for significance, and associations were considered significant at $p<0.05$.

CHAPTER 4

RESULTS AND DATA

Descriptive Statistics

Characteristics of the youth sample are depicted in Table 1. A majority of the youth were male (59.7%), and the mean age was 12.5 ± 0.9 years. Youth reported consuming only 2.7 ± 1.4 cups of FV daily and over 8 teaspoon equivalents of added sugar from SSBs.

Table 1 *Age, gender, and reported intake of fruit/vegetables and added sugars from sugar-sweetened beverages among participating youth*

Variable		***N***	**%***
Gender	Male	74	59.7
	Female	50	40.3
		Mean ± SD	
Age (years)		12.5 ± 0.9	
Mean daily intake	FV (cup equivalents)	2.7 ± 1.4	
	Added sugars from SSBs (tsp equivalents)	8.6 ± 4.9	

Characteristics of the parent sample are depicted in Table 2. The majority of parents were female (89.5%). More than half of the parent participants reported less than a high school education (56.7%), and 64.8% also reported an annual household income below $25,000. The large majority of participants (77.5%) reported high food security; only 22.5% reported food insecurity. The participant sample reported a higher mean score for MOS (4.34 ± 0.7) than for AOS (2.39 ± 0.9).

Table 2 *Sociodemographic characteristics of participating parents*

Variable		***n***	**%***
Gender	Male	13	10.5
	Female	111	89.5
Highest education attained	Less than high school	68	56.7
	High school or greater	52	43.3
Annual Income	Less than $25,000	79	64.8
	$25,000 or more	12	35.2
Food Security	Food Secure	93	77.5
	Food Insecure	27	22.5
Acculturation	**Mean ± SD**		
AOS**	2.4 ± 0.9		
MOS†	4.3 ± 0.7		

*Valid percent excluding all missing cases.
**Anglo-oriented acculturation-rating scale scored from 1-5
† Mexican-oriented acculturation rating scale scored from 1-5

Results for parent-reported family meal frequency are recorded in Table 3. Half of all parent participants reported eating meals with all or most family at least 7 times in the past week (50%). Another 38.7% of parents reported having family meals 3-6 times per week. The rest of participants reported family meals 2 or fewer times in the past week.

Table 3 *Parent-reported family meal frequency in the past 7 days*

Family meal frequency	n	%*
2 or fewer times	14	11.3
3-6 times	48	38.7
7 or more times	62	50.0

*Valid percent excluding all missing cases.

Family Meal Frequency and Youth Dietary Intake

Results of the bivariate analysis for youth FV and SSB intake are recorded in Table 4. Mean daily intake of FV among youth was 2.7 ± 1.4 cup equivalents, and mean daily intake of added sugar from sugar-sweetened beverages was 8.6 ± 4.9 teaspoon equivalents. Intake of FV or added sugar from SSBs did not correlate with family meal frequency (p=0.256 and p=0.807, respectively).

Table 4 *Spearman correlation coefficients for the associations between parent-reported family meal frequency and youth intake of fruit/vegetables and sugar from sugar-sweetened beverages*

Youth intake variables	*r*	r^2	P-value
FV (cup equivalents)	-0.154	0.024	0.256
Added sugar from SSBs (tsp equivalents)	0.027	0.001	0.807

Education, Income, Food Insecurity and Family Meal Frequency

Results of the Chi Square analysis between sociodemographic characteristics and family meal frequency are recorded in Table 5. An association between education level and family meal frequency was found significant, $X^2 = 8.559$ (2, N = 120), p = 0.014; a majority of participants reporting lower family meal frequency also reported a lower level of education (84.6%, n=11). Family meal frequency did not differ by income level, $X^2 = 1.872$ (2, N=122), p = 0.392. Food insecurity was also shown not to be associated with family meal frequency, N=120, $X^2=0.564$ (p=0.754).

Table 5 *Chi Square test results for associations between parent-reported family meal frequency and parent education, income level, and food security*

Independent variables	**Weekly Family Meal Frequency***			**X^2**	**P-value**
	2 or fewer	3-6	7 or more		
Education					
Less than high school	11 (84.6)	20 (42.6)	37 (61.7)	8.559	**0.014**
High school or greater	2 (15.4)	27 (57.4)	26 (38.3)		
Annual Income					
Less than $25,000	10 (76.9)	28 (58.3)	41 (67.2)	1.872	0.392
$25,000 or more	3 (23.1)	20 (41.7)	20 (32.8)		
Food Security*					
Food secure	10 (71.4)	35 (76.1)	48 (80.0)	0.564	0.754
Food insecure	4 (28.6)	11 (23.9)	12 (20.0)		

**All values reported as n (% of participants within each family meal frequency category*

Results of the Spearman rank correlation analysis assessing associations between family meal frequency and acculturation are shown in Table 6. Neither AOS nor MOS were significantly correlated with family meal frequency (p=0.0.591 and 0.052, respectively).

Table 6 *Spearman correlation coefficients between parent-reported family meal frequency and parent acculturation level*

Acculturation subscale	Mean ± SD	R	r^2	P-value
AOS*	2.39 ± 0.96	-0.049	0.002	0.591
MOS**	4.34 ± 0.72	0.176	0.031	0.052

*Anglo-oriented acculturation-rating scale scored 1-5
**Mexican-oriented acculturation rating scale scored 1-5

CHAPTER 5

DISCUSSION

In the current study family meal frequency was not associated with youth intake of fruits/vegetables or sugar from SSBs. Similarly, there was no association between income, acculturation, or food insecurity with family meal frequency. In contrast, there was a significant association between parent education level and family meal frequency.

Family Meal Frequency and Youth Dietary Intake

In previous research, family meals have been associated with healthful dietary traits, such as increased FV consumption (Gillman et al, 2008; Christian et al, 2013; Draxten et al, 2014) and reduced SSB intake (Draxten et al, 2014). However, in the present study there was no association between parent-reported family meal frequency and youth daily intake of fruits, vegetables, or added sugars from sugar-sweetened beverages. It was noted that youth intake of FV (about 2.7 cup equivalents) was relatively low compared to the AHA's recommendation of 4.5 cups per day (Steinberger et al, 2016). However, this intake is still higher than data from NHANES 2007, which demonstrates an intake of only 1.5 cup equivalents of combined FV among Latinx youth aged 14-18 (Moore, Thompson, & Demissie, 2018). In previous reports, adherence to recommended FV intake among Latinx adolescents is slightly higher than in white, non-Latinx and black, non-Latinx adolescents (Steinberger et al, 2016). Furthermore, according to NHANES 2007-2010, intake of FV within Latinx adolescents was also slightly higher than the average intake of Latinx individuals 18 years of age and older, who consumed about 2

cups combined FV per day (Moore et al, 2015). Even this number is comparatively higher than non-Latinx Black adolescents, who consumed just over 1.5 cups of FV per day according to the same study (Moore et al, 2015). This demonstrates that while FV intake in Latinx youth is sub-optimal, it is only part of a larger lack of national adherence to dietary guidelines among many groups.

In the present study, adolescents' daily intake of added sugars from SSBs was relatively high (about 8.6 teaspoon equivalents per day, which roughly contributes about 134 kcal per day) compared with the AHA's recommendation to limit added sugars from SSBs to 450 kcal per week (REF here). This is consistent with findings from other studies suggesting that fewer than 30% of Latinx adolescents meet recommendations for added sugars intake from SSBs (Steinberger et al, 2016). In previous reports, adherence to SSB recommendations among Latinx adolescents was lower compared with non-Latinx black adolescents, who reported slightly higher than 30% compliance, and non-Latinx white adolescents, among whom almost 40% reported compliance (Steinberger et al, 2016). However, data from NHANES 2015-2016 show that Latinx adolescents 12-19 years of age consumed an average of 106 g of total sugars per day, and both non-Hispanic black and white adolescents consumed even higher amounts at 113 g and 120 g, respectively (USDA ARS, 2019). Provided this, added sugar intake among the present study's participants is lower as compared to national data.

Fifty percent of parent participants reported eating family meals 7 or more times in the past week. Findings from NHANES 2007-2010 also found this to be true across all sociodemographic groups in the United States, with just under half of households reporting 7 or more family meals in the last week (Newman et al, 2015). Relative to

households of other ethnic groups, Latinx households were more likely to report 7 or more family meals in a week (Newman et al, 2015). However, in-depth study of family meal habits in Latinx households remains inadequate.

Frequent family meals have been associated with improved dietary behaviors in youth, including increased FV intake and decreased added sugar intake, in a number of studies of children aged 8-12 years and in middle and high school-aged students (Draxten et al, 2014; Neumark-Sztainer et al, 2003; Videon & Manning, 2003). Results from the present study are inconsistent with previous findings. One reason may be that, compared with younger children, adolescents are exposed to foods daily outside of the family meal setting, including at school and when out with friends, and thus may be more so influenced by food exposures outside of the home environment (Birch, Savage, & Ventura, 2007). Another reason for the lack of observed association may be that the *composition* of family meals is more impactful to youth intake than mere frequency of family meals. A multitude of research supports that frequently exposing youth to particular food groups positively affects their overall consumption of those food groups (Birch, Savage, & Ventura, 2007). This study did not examine the frequency of offering particular food groups at family meals, such as green salads, fruits, dairy, and sugar-sweetened beverages.

Parent Sociodemographic Factors and Family Meal Frequency

In the present study, there was no association between parent income and family meal frequency. In part, this could be attributed to the homogeneity of participants in this study. The majority of the sample reported low income, perhaps making a clear

distinction in family meal habits between higher and lower income families more difficult. Moreover, the proportion of participants reporting food insecurity was relatively low. Although some studies have suggested a positive association between socioeconomic factors and family meal frequency (Bruening et al, 2012; Widome et al, 2009; Neumark-Sztainer et al, 2003), others suggest that frequent family meals are more common among lower-income families, with one study finding a negative association between family meal occurrences and increasing income-to-poverty ratio (Newman et al, 2015). Possible reasons for this include more time available due to parent unemployment, as another study of diverse families in Ohio found that families in which one or more adults are unemployed were more likely to enjoy family meals (Tumin & Anderson, 2015). However, the actual reasons that lower-income families partake in more frequent family meals have yet to be largely explored.

The present study found a significant relationship between parent's highest level of education and the frequency of family meals. Research assessing the relationship between parent education and family meals is inconclusive. One possible reason for an association between higher parent education and frequent family meals is the fact that parents with lower education levels are more likely to work lower-wage positions and thus may work multiple jobs, leaving less time for food preparation at home and inability to preserve time for a family meal each day (Ross & Bateman, 2019). A study among Australian mothers with young children supported a positive association between parent education and frequency of family meals; however, this study was conducted via online survey and with mothers among whom 71% reported having a university degree (Litterbach, Campbell, & Spence, 2017). Another study actually found that frequent

family meals were more common among households headed by someone with less than a high school education, although reasons for this are unclear (Newman et al, 2015).

Insufficient research exists examining the influence of acculturation on family meal habits. In this study, no significant association was found between parent acculturation level, parent food insecurity score, and reported family meal frequency. In this sample, there was a somewhat homogenous distribution of acculturation scores; the majority of participants were reported high Mexican cultural orientation and moderate Anglo cultural orientation. This lack of diversity in degree of acculturation may have made it more difficult to assess differences in family meal habits. The importance of family and family-oriented meals is a documented pillar of Mexican culture, and thus may explain why the majority of participants reported frequent family meals in this highly Mexican-oriented sample (Coe et al, 2018). One study found that adolescents who enjoy frequent family meals in less acculturated homes were actually less likely to make healthy changes to BMI (Chang & Halgunseth, 2015). The material effects of moving away from these values through acculturation, however, have not been properly studied.

Some studies have found that food insecurity increases the propensity of families to opt for fast food meals over home-cooked family meals (Widome et al, 2009). One study also found that greater food insecurity was associated with less healthful foods served at family meals (Bruening et al, 2012). Studies have shown Latinx households to be more likely to experience food insecurity, and that Latinx households experiencing food insecurity are more likely to feature mothers pressuring their children to overeat (Coleman-Jensen et al, 2019; Matheson et al, 2006). However, studies assessing the impact of food insecurity on healthfulness of meals specifically in Latinx households

have not been conducted. The lack of an association between food insecurity and family meal frequency in this study may be explained in part by lack of diversity in the sample, as most of the participants reported not experiencing food insecurity.

It is important to note that other factors potentially affecting family meal frequency, meal composition, and youth intake have been identified, but were not addressed in the present analysis. Family cohesion has been observed to mediate the relationship between family meal behaviors and individual dietary behaviors (Welsh et al, 2011). Additionally, media use during meals has been found to negatively impact both communication during meals and the overall healthfulness of the meals (Fulkerson et al, 2014; Trofholz et al, 2017). Marketing is observed to increase the likelihood of youth consuming the foods advertised (Dixon et al, 2014; Kraak & Story, 2015). Youth participation in school lunch is observed to lead to greater intake of foods served, and exposure to school meals is associated with higher diet quality (Au et al, 2016; HHS & USDA, 2015; Story, Nanney, & Schwarts, 2009). Lastly, peer influences are found to affect youth diet and physical activity behaviors, as youth mirror those of their friends (Chung, Ersig, & McCarthy, 2017). None of these factors were explored in the present analysis and their potential effects on intake and family meal practices in the sample were not taken into account.

Strengths and limitations

There are a number of strengths to this study. As a cross-sectional correlational study, the discovery of associations between variables may be more applicable to everyday life since the constraints of an experiment are not applied. Additionally, this

study utilized a number of validated scales to measure otherwise abstract concepts such as acculturation and food insecurity, and the validity of the DSQ for assessing dietary intake is supported by other population studies (Thompson et al, 2018). Also, this study assesses an understudied topic (family meals) and focuses on a population that is largely underrepresented in dietary research (Latinx youth and families). This study explores possible associations between parent behaviors and youth dietary intake, which is not largely undertaken in research. Lastly, this study provides valuable information on current fruit, vegetable, and added sugar intake in a Latinx adolescent sample, albeit small, and exposes the necessity for future interventions to improve these behaviors.

Many challenges and limitations exist regarding community-based correlational studies. Because data was collected through self-reported survey measures in this study, other issues may affect the integrity and accuracy of the data including reporting bias, recall bias, selection bias, and social desirability bias. The lack of truly objective measurements of parameters such as sociodemographic factors, acculturation, food insecurity, and dietary intake inevitably results in the possibility of the previously described biases, and therefore results will need to be interpreted accordingly. Sample size and reporting bias may partially explain the lack of significant findings in many of the analyses.

The various measurement instruments utilized in the survey (including acculturation scale, NCI's DSQ, and food insecurity questionnaire) have been previously validated. However, these measures still operate based on participant self-report and are therefore subject to reporting bias and other biases. While the DSQ has been validated in children and adults, this tool has yet to be validated in adolescent populations. The DSQ

is a tool that estimates frequencies of intake rather than absolute intakes, which are then computed to estimated intakes with an algorithm; in the process, accuracy of intake may be lost. Additionally, social desirability bias may influence results of the DSQ, resulting in over- or underreporting of intake. Lastly, while *frequency* of family meals was addressed in this study, the *composition* of these family meals was not, and thus any effects of meal composition on youth intake could not be taken into account.

Generalizability of findings may be limited by participant characteristics as well as sample size. This study analyzes a sample of Latinx parents/caregivers and their 6^{th}-8^{th} grade children, and findings may not be applicable to other age groups or sociodemographic groups. Additionally, this study examined families living in Maricopa County in Phoenix, Arizona, and any findings may not be comparable to findings from a different geographic area. Lastly, this study utilized a convenience sample, and as such, its findings may not be applicable to more general populations of Latinx individuals.

Challenges of cross-sectional analysis exist, including the inability to derive time- or treatment-based effects. Cross-sectional studies also cannot yield causative findings due to lack of controls e.g. control groups and randomization; all findings are, therefore, purely correlational in nature.

Conclusion

This study exploring the relationship between parent-reported family meal frequency and youth intake of fruits, vegetables, and added sugar found no association between family meal frequency and youth intake. Further, family meal frequency was not found to be associated with parent income level, acculturation level, and food insecurity. However,

there was a statistically significant association between family meal frequency and parent education level. The association between family meals and parent education suggests a potential area for intervention, such as opportunities to improve parent knowledge and educational attainment via tools and resources. Further research is needed to better understand the mechanisms by which parent education may impact family meal habits, and future studies are needed to identify effective means to increase parent access to improve knowledge and access to adequate education. The additional finding that youth are consuming fewer fruits and vegetables than recommended, as well as greater amounts of added sugar than recommended, is a poignant reminder of the immediate need for effective intervention to improve their dietary habits.

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APPENDIX A

INSTITUTIONAL REVIEW BOARD

ASU Knowledge Enterprise Development

APPROVAL FULL BOARD

Sonia Vega-Lopez
SNHP: Nutrition
602/827-2268
Sonia.Vega.Lopez@asu.edu

Dear Sonia Vega-Lopez:

On 9/28/2017 the ASU IRB reviewed the following protocol:

Type of Review:	Initial Study
Title:	Multi-level effects of a parenting intervention for enhancing Latino youth health behaviors
Investigator:	Sonia Vega-Lopez
IRB ID:	STUDY00006797
Funding:	Name: HHS-NIH: National Center on Minority Health and Health Disparities (NIMHD), Grant Office ID: FP00011681
Grant Title:	FP00011681;
Grant ID:	FP00011681;
Documents Reviewed:	• Focus Group Consent, Category: Consent Form; • FPNG+Protocol-Version1-092117-CLEAN, Category: IRB Protocol; • Safety Net - List of resources-Tracked, Category: Resource list; • Home Food Inventory, Category: Measures (Survey questions/Interview questions /interview guides/focus group questions); • FPNG+ Grant Proposal, Category: Grant application; • Survey for Youth, Category: Measures (Survey questions/Interview questions /interview guides/focus group questions); • Parent Permission-Tracked, Category: Consent Form; • Adult Consent Control-Clean, Category: Consent Form;

	• Food Frequency Questionnaire for Adults, Category: Measures (Survey questions/Interview questions /interview guides/focus group questions); • Parent Permission-Clean, Category: Consent Form; • Safety Net - List of resources-Clean, Category: Resource list; • Results Letter - Adult, Category: Participant materials (specific directions for them); • Focus Group Recruitment Script, Category: Recruitment Materials; • Food Frequency Questionnaire for Youth, Category: Measures (Survey questions/Interview questions /interview guides/focus group questions); • Survey for Parents, Category: Measures (Survey questions/Interview questions /interview guides/focus group questions); • Letter of Support ADA, Category: Other (to reflect anything not captured above); • Adult Consent FPNG+-Clean, Category: Consent Form; • ADA Call Center Information Session Script Control, Category: Recruitment Materials; • Williams LR CITI_11236361_120817.pdf, Category: Other (to reflect anything not captured above); • Child Assent-Tracked, Category: Consent Form; • ADA Call Center Information Session Script FPNG, Category: Recruitment Materials; • Adult Consent FPNG-Tracked, Category: Consent Form; • Response to Comments from IRB, Category: Other (to reflect anything not captured above); • Focus Group Guide, Category: Measures (Survey questions/Interview questions /interview guides/focus group questions); • ADA Call Center Information Session Script FPNG+, Category: Recruitment Materials; • Adult Consent FPNG+-Tracked, Category: Consent Form; • FPNG+ Grant Proposal, Category: Sponsor Attachment; • Adult Consent FPNG-Clean, Category: Consent Form; • Child Assent-Clean, Category: Consent Form; • Adult Consent Control-Tracked, Category: Consent Form;

	• FPNG+Protocol-Version1-092117-Tracked, Category: IRB Protocol; • Results Letter - Youth, Category: Participant materials (specific directions for them);

The IRB approved the protocol from 9/15/2017 to 9/14/2018 inclusive. Before 9/14/2018, you are to submit a completed Continuing Review application and required attachments to request continuing approval or closure.

If continuing review approval is not granted before the expiration date of 9/14/2018 approval of this protocol expires on that date. When consent is appropriate, you must use final, watermarked versions available under the "Documents" tab in ERA-IRB.

In conducting this protocol you are required to follow the requirements listed in the INVESTIGATOR MANUAL (HRP-103).

Sincerely,

IRB Administrator

cc: Patricia Dustman
Mary Harthun
Stephanie Ayers
Anaid Gonzalvez
Lela Williams
Leopoldo Hartmann Manrique
Irma Vega de Luna
Patricia Dustman
Flavio Marsiglia
Gabriel Shaibi
Meredith Bruening

APPENDIX B

PARENT CONSENT

Southwest Interdisciplinary Research Center
ARIZONA STATE UNIVERSITY

Multi-level effects of a parenting intervention for enhancing Latino youth health behaviors

Dear Parent: **[Semester]**

We are from the School of Nutrition and Health Promotion and the School of Social Work at Arizona State University. We are studying 6th,7th, and 8th graders' life experiences such as their diet habits and what happens when they encounter alcohol, tobacco, and other drugs, including personal drug use and their response at times when they get into situations that are risky. Parents who participate in the American Dream Academy workshops throughout the Valley are helping us. We are requesting your participation in workshops called ***Families Preparing the New Generation Plus***. During the workshops, you will learn how to reinforce anti-drug norms that are culturally appropriate, how to help strengthen your children, and how to communicate with your child about sensitive topics such as drug use/abuse and other risky behaviors. You will also learn about strategies to improve the quality of your child's diet.

Three times throughout the academic year, you will be asked to fill out confidential surveys to help us. Each survey takes about 60 minutes. You will be asked about your family practices, family communication, and relationship with your child. All project surveys are voluntary, and there is no impact on your student's schoolwork or academic records. We will be collecting contact information for tracking and follow-up purposes only. Although the contact information form will be part of the survey, once you have taken the survey and it has been uploaded to the main database, we will save your contact information into a separate database from all of the survey answers so that all that is left on the survey is just a unique ID number. People who agree to participate in the surveys will have this unique identification code that links them with their children but not to anyone else. That code will be used throughout the study. Because an identification code is used, your name will not be included on any survey or in any reports. Please remember that if you choose not to participate in the research study, you can still attend all of the 2.5 hour long workshops.

A small number of participants will be randomly selected (by chance) to participate in additional optional data collection in their home every time they complete a survey. If you are selected to participate, a study staff member will visit your home to measure your height, weight, and blood pressure, to collect a small blood sample from your finger (finger prick to get three to four drops of blood) to measure indicators of diabetes and heart disease risk (HbA1c and cholesterol), and to ask you to complete a survey about the foods you eat. The study staff will also ask permission to inventory the foods you keep in your kitchen. This visit is optional and voluntary and will take about 90 minutes. You do not have to agree to this additional visit to be part of the larger study or to participate in the American Dream Academy workshop. If you choose to participate in these three additional visits, you will receive $20 for each visit for a possible total of $60 for all visits together. If desired, we will share blood pressure and finger prick results with you during this visit. If we find values that may indicate high blood pressure or elevated risk for diabetes or heart disease, we will give you the values and recommend that you discuss those with you doctor.

By filling out the consent form below, you are telling us that you wish to participate in these parent workshop surveys and whether you would agree to participate in the additional data collection in your home. If you choose not to participate, or if you want to stop at any time, there is no penalty—it won't affect you or your child negatively in any way. Your choice will not affect your student's academic records or schoolwork. If you would like to participate, please fill in the spaces below and return the signed form to your facilitator at this meeting.

ASU IRB IRB # STUDY00006797 | Approval Period 9/7/2018 – 9/13/2019

If you have any questions at any time, please call us at 602-496-0700, and we will be happy to answer them. For more information about us, please visit our website at http://sirc.asu.edu. If you have any questions regarding your rights as a research participant, or if you feel that you or your family's personal security has been placed at risk, please contact the Chair of the Human Subjects Institutional Review Board, through the ASU Research Compliance Office, at (480) 965-6788.

Thank you for your consideration!

Sincerely,

Sonia Vega-López, Ph.D., Principal Investigator
Downtown Phoenix Campus, ASU, Phoenix, AZ 85004

PLEASE READ THIS:

Project surveys

I agree to participate in the three project surveys but understand that I may choose not to participate at any time. I understand that by filling in the spaces below, the information will be used by project staff to keep research project contact information.

Signature:_____Date:_____

Additional data collection at home

Please check one of the following options below regarding additional data collection in your home:

☐ I DO agree to participate in the collection of additional data in my home to measure my height, weight, and blood pressure, to collect a finger prick blood sample, and to complete a survey about the foods I eat. I understand that I may choose not to participate at anytime.

☐ I DO NOT agree to participate in the collection of additional data in my home.

Signature:_____Date:_____

Kitchen food inventory

If you agreed to additional data collection in your home, please check one of the following options regarding inventorying the foods you keep in your kitchen:

☐ I DO agree to a having a study staff inventory the foods I keep in my kitchen. I understand that I may choose not to participate at anytime.

ASU IRB IRB # STUDY00006797 | Approval Period 9/7/2018 – 9/13/2019

☐ I DO NOT agree to having a study staff inventory the foods I keep in my kitchen.

Signature:_____Date:_____

Contact Information

Please print the following:

Your Name: _____
First Middle Last

Month of birth:_____ **Day of birth:** _____

Address:_____
Street City Zip

Phone: _____ _____ **Email:**_____
Home Cell

Child in 6th-8th Grade Name: _____
First Middle Last

Child's Date of Birth:_____/_____/_____
Month Day Year

Name of Child's School:_____

APPENDIX C

PARENT PERMISSION

Southwest Interdisciplinary Research Center
ARIZONA STATE UNIVERSITY

Multi-level effects of a parenting intervention for enhancing Latino youth health behaviors

Dear Parent/Guardian:

We are from the School of Nutrition and Health Promotion and the School of Social Work at Arizona State University. We are studying 6th,7th, and 8th graders' life experiences such as their diet habits and what happens when they encounter alcohol, tobacco, and other drugs, including personal drug use and their response at times when they get into situations that are risky. In partnership with the **American Dream Academy**, we are inviting families at many schools to help us. If you will be attending a workshop from the American Dream Academy and agreed to participate in our confidential surveys for parents, we are requesting your permission for your child to be part of this research as well.

Three times throughout the project, your child will be asked to fill out a confidential survey. Each survey takes about 45 minutes, and kids will be asked about their diet, what they know about alcohol, tobacco, and other drugs, as well as about personal life experiences with those drugs including whether they have used illegal drugs. All project surveys are voluntary, and youth will not be penalized for deciding not to participate or by withdrawing at any time. Your child will always have a choice to take a survey or not. There is no effect on your child's school work or records. The surveys are confidential. We will be collecting contact information for tracking and follow-up purposes only. Although the contact information form will be part of the survey, once your child has taken the survey and it has been uploaded to the main database, we will save your child's individual information into a separate database from all of the survey answers so that all is left on the survey is just an ID number. So, your child's name will not be included in reports or in any information that goes to teachers or schools. The survey asks questions about diet and attitudes, behaviors, anti-drug norms, and responses to offers of alcohol or drugs and risky behaviors. Your child will receive an incentive such as key chains and Frisbees for each survey completed.

A small number of families will be randomly selected (by chance) to participate in additional optional data collection in their home every time they complete a survey. If you and your child are selected to participate, a study staff member will visit your home at a time when both you and your child are available to measure your child's height, weight, and blood pressure, to collect a small blood sample from your child's finger (finger prick to get three to four drops of blood) to measure indicators of diabetes and heart disease risk (HbA1c and cholesterol), and to ask your child to complete a survey about the foods he/she eats. This visit is optional and voluntary and will take about 90 minutes. Your child will receive $10 for each visit for a possible total of $30. You do not have to give permission for your child to participate in this additional visit for your child to be part of the larger study. If desired, we will share blood pressure and finger prick results with your child and you during this visit. If we find values that may indicate high blood pressure or elevated risk for diabetes or heart disease, we will give you the values and recommend that you discuss those with your child's doctor.

By signing below and returning this letter to the school liaison you give your permission for your child to participate in the surveys. Your decision is entirely voluntary. If you choose not to have your child participate, or to withdraw your child at any time, there will be no penalty or negative effect for you or your child. Even if you give your child permission to participate in the program, your child's participation remains voluntary—he or she gets to choose whether or not to take the surveys or to withdraw at any time with no penalty. The results of the study may be published, but your child's name will not be used.

If you have any questions, please call us at 602-496-0700 and we will be happy to answer them. For more information about us, please visit our website at http://sirc.asu.edu. If you have any questions regarding your child's rights as a research subject, or if you feel that your child has been placed at risk, please contact the Chair of the Human Subjects Institutional Review Board, through the ASU Research Compliance Office, at (480) 965-6788.

Thank you for your consideration!

Sincerely,

Sonia Vega-López, Ph.D.
Principal Investigator, ASU

By signing below, you are giving your permission for **your child** to participate in the surveys.

Parent's signature:_____ Date:_____

By signing below, you are giving your permission for **your child** to participate in the additional data collection at your home.

Parent's signature: _____ Date: _____

Contact Information

Please print the following:

Parent Name: _____
First Middle Last

Address:_____
Street City Zip

Phone: _____ _____ **Email:**_____
Home Cell

Child in 6th, 7th, or 8th Grade Name: _____
First Middle Last

Child's Date of Birth: _____ /_____ /_____
Month Day Year

Name of Child's School:_____

You will be contacted to learn more about the American Dream Academy and how you can get involved.

Teacher name:_____

Liaison initials:_____

Date received: _____

ASU IRB IRB # STUDY00006797 | Approval Period 9/7/2018 – 9/13/2019

APPENDIX D
YOUTH ASSENT

Southwest Interdisciplinary Research Center
ARIZONA STATE UNIVERSITY

Multi-level effects of a parenting intervention for enhancing Latino youth health behaviors

Dear Student:

We are from the School of Nutrition and Health Promotion and the School of Social Work at Arizona State University. We are doing research to better understand 6th,7th, and 8th graders' life experiences such as what they eat and what happens when they are exposed to alcohol, tobacco, and other drugs. Schools all around Phoenix, including your school, are helping us. Families who attend the American Dream Academy program are being invited to help us, too. We hope this research will help us find out ways to help kids like you to stay drug free and eat a healthy diet.

You are being invited to help us by filling out three confidential surveys throughout the year. Each survey takes about 45 minutes, and you will be asked about diet, alcohol, tobacco, and drugs. The surveys are voluntary. Your parent/guardian has given permission for you to fill it out, but you get to decide if you want to take the survey. We will collect contact information for tracking and follow-up purposes only. So even though the contact information form is part of the survey, once you take the survey and it is uploaded to the main database, we will take out your contact information and put it in a separate database from all of the survey answers so that all that will be left on your survey is just an ID number. After this, your information will be confidential. So, your parents will never find out what answers you choose and neither will your teachers or your school. You will receive a small item, such as a Frisbee or a key chain, as our way to thank you for completing each survey.

A small number of families will also be invited to participate in additional data collection in their home. If your family is selected, you will be invited to also allow us to measure your height, weight, and blood pressure, give us a small blood sample from your finger (finger prick—3 to 4 drops), and complete a survey about the foods you eat. The blood test will help us learn more about indicators of diabetes and heart disease risk. These optional activities will take about 90 minutes. You will receive $10 for each visit for a possible total of $30.

By filling out and signing the form below, you agree to take the survey. You can also indicate whether you would like to participate in the additional data collection activities if your family is selected for those. If you choose not to or if you want to stop at any time, there's no penalty—it won't affect your grade or anything. If you would like to take the survey, please fill in the spaces below and return this letter to your facilitator.

If you have any questions, you can always call us at 602-496-0700 and we will be happy to answer them. For more information, please visit our website at http://sirc.asu.edu. ***Thank you!***

Sincerely,

Sonia Vega-López, Ph.D., Principal Investigator
ASU, Phoenix, AZ

Project surveys

I know I have permission to take the surveys and I know what the questions are about. I going to take the survey because I want to, and I know that I can stop any time. I can skip any questions I don't want to answer, and I know that deciding not to participate is okay.

Signature:_____ Date:_____

Additional data collection at home

Please check one of the following options below about additional data collection in your home:

☐ I DO agree to participate in the collection of additional data in my home to measure my height, weight, and blood pressure, to collect a finger prick blood sample, and to complete a survey about the foods I eat. I understand that I may choose not to participate at any time.

☐ I DO NOT agree to participate in the collection of additional data in my home.

Signature:_____ Date:_____

Please print:

Your Name: _____
First Middle Last

Month of birth: _____ **Day of birth:** _____

Names of your Parents or Guardians:

_____
First Middle Last

_____
First Middle Last

APPENDIX E

PARENT SURVEY

SOCIODEMOGRAPHIC QUESTIONS

What is the highest grade of education you have completed?

1. Did not complete high school
2. Received a high school diploma or GED
3. Attended or graduated from a technical or trade school
4. Attended or graduated from two-year junior or community college
5. Attended or graduated from four-year college or university
6. Earned a post-graduate degree (e.g. master's degree, law school)

What is your best estimate of your households' total annual income?

1. Less than $10,000
2. $10,000 - $14,999
3. $15,000 - $19,999
4. $20,000 - $24,999
5. $25,000 - $29,999
6. $30,000 - $49,999
7. $50,000 - $74,999
8. $75,000 or more

FOOD SECURITY SCALE

Please indicate how often each statement was true for your household in the last 12 months:

		Often true	Sometimes true	Never true
1.	The food that we bought just didn't last, and we didn't have money to get more.	1	2	3
2.	We couldn't afford to eat balanced meals.	1	2	3

3. In the last 12 months, did you or other adults in your household ever cut the size of your meals or skip meals because there wasn't enough money for food?

☐ 1 No
☐ 2 Yes, only 1 or 2 months
☐ 3 Yes, some months but not every month
☐ 4 Yes, almost every month

4. In the last 12 months, did you ever eat less than you felt you should because there wasn't enough money for food?

☐ 1 No
☐ 2 Yes
☐ 3 Don't know

5. In the last 12 months, were you ever hungry but didn't eat because there was not enough money for food?

☐ 1 No
☐ 2 Yes
☐ 3 Don't know

ACCULTURATION SCALE

	Not at all	Very little or not very often	Moderately	Much or very often	Extremely often or almost always
1. I speak Spanish.	1	2	3	4	5
2. I speak English.	1	2	3	4	5
3. I enjoy speaking Spanish	1	2	3	4	5
4. I associate with Anglos.	1	2	3	4	5
5. I enjoy watching TV in Spanish.	1	2	3	4	5
6. I enjoy watching movies in English.	1	2	3	4	5
7. I enjoy watching movies in Spanish.	1	2	3	4	5
8. I enjoy reading (e.g., books) in Spanish.	1	2	3	4	5
9. I write (e.g. letters) in English.	1	2	3	4	5
10. I think in English.	1	2	3	4	5
11. I think in Spanish.	1	2	3	4	5
12. My friends are of Anglo origin.	1	2	3	4	5

FAMILY MEAL FREQUENCY

The next questions are about your <u>FAMILY'S</u> eating habits…

During the <u>past week</u>, how many times did all, or most, of your <u>family</u> living in your household eat a meal together?

1 ☐ Never
2 ☐ 1-2 times
3 ☐ 3-4 times
4 ☐ 5-6 times
5 ☐ 7 times
6 ☐ More than 7 times

DIETARY SCREENER QUESTIONNAIRE

In the following questions, we want to know about how often or how frequently you eat certain types of foods. Please tell us the number of times you typically eat the food and whether this is per day, per week, or per month. If you never eat the food, mark "never".

For example, if you were asked how often you drank water in the past month and you typically drink 2 glasses of water per day, you would answer as follows:

During the past month…	**Times (number)**	**Per Day** 1	**Per Week** 2	**Per Month** 3	**Never** 0	**Refused** 99	**Don't know** 77
Example How often did you drink **water**?	2	**X**	**O**	**O**	**O**	**O**	**O**

Please now indicate how often you have been consuming the following foods per day, week or month.

During the past month…	**Times (number)**	**Per Day** 1	**Per Week** 2	**Per Month** 3	**Never** 0	**Refused** 99	**Don't know** 77
1) How often did you eat **hot or cold cereals**?		**O**	**O**	**O**	**O**	**O**	**O**
2) What kinds of cereal did you **usually** eat? List them (brand/name) 1. _____ 2. _____ 3. _____	_____ _____ _____	**O** **O** **O**	**O** **O** **O**	**O** **O** **O**	**O** **O** **O**	**O** **O** **O**	**O** **O** **O**
3) How often did you have **milk** (either drink or with cereal)? Do not include soy milk or small amounts of milk in coffee or tea.		**O**	**O**	**O**	**O**	**O**	**O**

During the past month…	**Times (number)**	**Per Day** 1	**Per Week** 2	**Per Month** 3	**Never** 0	**Refused** 99	**Don't know** 77
4) During the past month, what kind of **milk** did you usually dink? *(Choose one)* 1. Whole or regular milk 2. 2% fat or reduced-fat milk 3. 1%, ½%, or low-fat milk 4. Fat-free, skim or nonfat milk 5. Soy milk 6. Other kind of milk _____ (please specify)							
4) How often did you drink regular **soda or pop that contains sugar**? **Do not** include diet soda.		**O**	**O**	**O**	**O**	**O**	**O**
5) How often did you drink **100% pure fruit juice** such as orange, mango, apple, grape and pineapple juices? **Do not** include fruit-flavored drinks with added sugar or fruit juice you made at home and added sugar to.		**O**	**O**	**O**	**O**	**O**	**O**
6) How often did you drink coffee or tea that had added **sugar** or **honey** added to it? Include coffee and tea you sweetened yourself and presweetened tea and coffee drinks such as Arizona Iced Tea and Frappuccino. **Do not**		**O**	**O**	**O**	**O**	**O**	**O**

During the past month…	Times (number)	Per Day 1	Per Week 2	Per Month 3	Never 0	Refused 99	Don't know 77
include **artificially** sweetened coffee or diet tea.							
7) How often did you drink **sweetened** fruit drinks, sports energy drinks, such as, lemonade, Hi-C, cranberry drink, Gatorade, Red Bull or Vitamin Water? Include fruit juices you made at home and added sugar to. Include other drinks with added sugar: Tampico, Sunny Delight and Twister. **Do not** include diet drinks, artificially sweetened drinks, 100% juices or soda.		**O**	**O**	**O**	**O**	**O**	**O**
8) How often did you eat **fruit**? Include fresh, frozen or canned fruit. **Do not** include juices.		**O**	**O**	**O**	**O**	**O**	**O**
9) How often did you eat a green leafy or lettuce **salad**, with or without other vegetables?		**O**	**O**	**O**	**O**	**O**	**O**
10) How often did you eat any kind of **fried potatoes**, including French fries, home fries, or hash brown potatoes?		**O**	**O**	**O**	**O**	**O**	**O**
11) How often did you eat any **other kind of potatoes**, such as baked, boiled, mashed potatoes, or potato salad?		**O**	**O**	**O**	**O**	**O**	**O**
12) How often did you eat refried beans, beans in soup, pork and beans or		**O**	**O**	**O**	**O**	**O**	**O**

During the past month…	Times (number)	Per Day 1	Per Week 2	Per Month 3	Never 0	Refused 99	Don't know 77
any other type of cooked dried beans? Do not include green beans.							
13) How often did you eat **brown rice** or other cooked whole grains, such as bulgur, cracked wheat, or millet? **Do not** include white rice.		**O**	**O**	**O**	**O**	**O**	**O**
14) Not including what you just told me about (lettuce salads, potatoes, cooked dried beans), how often did you eat **other vegetables**? (e.g. tomatoes, green beans, carrots, corn, cabbage, bean sprouts, collard greens, and broccoli) including any form of the vegetable (raw, cooked, canned, or frozen).		**O**	**O**	**O**	**O**	**O**	**O**
15) How often did you have Mexican-type **salsa** made with tomato?		**O**	**O**	**O**	**O**	**O**	**O**
16) How often did you eat pizza? Include frozen pizza, fast food pizza, and homemade pizza.		**O**	**O**	**O**	**O**	**O**	**O**
17) How often did you have **tomato sauces** such as with spaghetti or noodles or mixed into foods such as lasagna? Do not count tomato sauce on pizza.		**O**	**O**	**O**	**O**	**O**	**O**
18) How often did you eat any kind of **cheese**? Include cheese as a snack, cheese on burgers, sandwiches, and cheese in		**O**	**O**	**O**	**O**	**O**	**O**

During the past month…	Times (number)	Per Day 1	Per Week 2	Per Month 3	Never 0	Refused 99	Don't know 77
foods such as lasagna, quesadillas, or casseroles. Do not count cheese on pizza.							
19) How often did you eat **red meat**, such as beef, pork, ham, or sausage? **Do not** include chicken, turkey or seafood.		**O**	**O**	**O**	**O**	**O**	**O**
20) How often did you eat processed meat, such as bacon, lunch meats, or hot dogs? Processed meat: meats (usually read meats, but not always) preserved by smoking, curing, or salting, or by the addition of preservatives. Examples: ham, bacon, pastrami, salami, sausages, bratwursts, frankfurters, hot dogs, or spam.		**O**	**O**	**O**	**O**	**O**	**O**
21) How often did you eat **whole grain** bread including toast, rolls and in sandwiches? Whole grain breads include whole wheat, rye, oatmeal and pumpernickel. **Do not** include white bread. (You can tell me per day, per week or per month).		**O**	**O**	**O**	**O**	**O**	**O**
22) How often did you eat **chocolate** or any other types of **candy**? **Do not** include **sugar-free candy**.		**O**	**O**	**O**	**O**	**O**	**O**
23) How often did you eat **doughnuts**, sweet rolls, Danish, muffins, (pan dulce) or pop-tarts? **Do not** include **sugar-free items**.		**O**	**O**	**O**	**O**	**O**	**O**

During the past month…	**Times (number)**	**Per Day** 1	**Per Week** 2	**Per Month** 3	**Never** 0	**Refused** 99	**Don't know** 77
24) How often did you eat **cookies**, **cake**, **pie** or **brownies**? **Do not** include **sugar-free** kinds.		**O**	**O**	**O**	**O**	**O**	**O**
25) How often did you eat **ice cream or other frozen desserts**? **Do not** include **sugar-free** kinds.		**O**	**O**	**O**	**O**	**O**	**O**
26) How often did you eat popcorn? **Include** low-fat popcorn.		**O**	**O**	**O**	**O**	**O**	**O**

APPENDIX F

YOUTH SURVEY

ACCULTURATION SCALE

The next set of questions asks you about your family and cultural background. Some of these questions use the term "Anglos." You might more commonly hear the term "Whites" instead of "Anglos," both mean the same thing. Think about the <u>past year</u>, as you answer these questions.

	Not at all	Very little or not very often	Moderately	Much or very often	Extremely often or almost always
6. I speak Spanish.	1	2	3	4	5
7. I speak English.	1	2	3	4	5
8. I enjoy speaking Spanish	1	2	3	4	5
9. I associate with Anglos.	1	2	3	4	5
10. I enjoy watching TV in Spanish.	1	2	3	4	5
11. I enjoy watching movies in English.	1	2	3	4	5
12. I enjoy watching movies in Spanish.	1	2	3	4	5
13. I enjoy reading (e.g., books) in Spanish.	1	2	3	4	5
14. I write (e.g. letters) in English.	1	2	3	4	5

15. I think in English.	1	2	3	4	5
16. I think in Spanish.	1	2	3	4	5
17. My friends are of Anglo origin.	1	2	3	4	5

DIETARY SCREENER QUESTIONNAIRE

In the following questions, we want to know about how often or how frequently you eat certain types of foods. Please tell us the number of times you typically eat the food and whether this is per day, per week, or per month. If you never eat the food, mark "never".

For example, if you were asked how often you drank water in the past month and you typically drink 2 glasses of water per day, you would answer as follows:

During the past month…	**Times (number)**	**Per Day**1	**Per Week**2	**Per Month**3	**Never**0	**Refused**99	**Don't know** 77
Example How often did you drink **water**?	2	**X**	**O**	**O**	**O**	**O**	**O**

Please now indicate how often you have been consuming the following foods per day, week or month.

During the past month…	**Times (number)**	**Per Day** 1	**Per Week** 2	**Per Month** 3	**Never** 0	**Refused**99	**Don't know** 77
1) How often did you eat **hot or cold cereals**?		**O**	**O**	**O**	**O**	**O**	**O**
2) What kinds of cereal did you **usually** eat? List them (brand/name)							
4. _____	____	**O**	**O**	**O**	**O**	**O**	**O**
5. _____	____	**O**	**O**	**O**	**O**	**O**	**O**
6. _____	____	**O**	**O**	**O**	**O**	**O**	**O**
3) How often did you have **milk** (either drink or with cereal)? Do not include soy milk or small amounts of milk in coffee or tea.		**O**	**O**	**O**	**O**	**O**	**O**

During the past month…	**Times (number)**	**Per Day** 1	**Per Week** 2	**Per Month** 3	**Never** 0	**Refused** 99	**Don't know** 77
4) During the past month, what kind of **milk** did you usually dink? *(Choose one)* 1. Whole or regular milk 2. 2% fat or reduced-fat milk 3. 1%, ½%, or low-fat milk 4. Fat-free, skim or nonfat milk 5. Soy milk 6. Other kind of milk _____ (please specify)							
4) How often did you drink regular **soda or pop that contains sugar**? **Do not** include diet soda.		**O**	**O**	**O**	**O**	**O**	**O**
5) How often did you drink **100% pure fruit juice** such as orange, mango, apple, grape and pineapple juices? **Do not** include fruit-flavored drinks with added sugar or fruit juice you made at home and added sugar to.		**O**	**O**	**O**	**O**	**O**	**O**
6) How often did you drink coffee or tea that had added **sugar** or **honey** added to it? Include coffee and tea you sweetened yourself and presweetened tea and coffee drinks such as Arizona Iced Tea and Frappuccino. **Do not** include **artificially** sweetened coffee or diet tea.		**O**	**O**	**O**	**O**	**O**	**O**

During the past month…	Times (number)	Per Day 1	Per Week 2	Per Month 3	Never 0	Refused 99	Don't know 77
7) How often did you drink **sweetened** fruit drinks, sports energy drinks, such as, lemonade, Hi-C, cranberry drink, Gatorade, Red Bull or Vitamin Water? Include fruit juices you made at home and added sugar to. Include other drinks with added sugar: Tampico, Sunny Delight and Twister. **Do not** include diet drinks, artificially sweetened drinks, 100% juices or soda.		O	O	O	O	O	O
8) How often did you eat **fruit**? Include fresh, frozen or canned fruit. **Do not** include juices.		O	O	O	O	O	O
9) How often did you eat a green leafy or lettuce **salad**, with or without other vegetables?		O	O	O	O	O	O
10) How often did you eat any kind of **fried potatoes**, including French fries, home fries, or hash brown potatoes?		O	O	O	O	O	O
11) How often did you eat any **other kind of potatoes**, such as baked, boiled, mashed potatoes, or potato salad?		O	O	O	O	O	O
12) How often did you eat refried beans, beans in soup, pork and beans or any other type of cooked dried beans? Do not include green beans.		O	O	O	O	O	O
13) How often did you eat **brown rice** or other cooked whole grains, such as bulgur,		O	O	O	O	O	O

During the past month…	Times (number)	Per Day 1	Per Week 2	Per Month 3	Never 0	Refused 99	Don't know 77
cracked wheat, or millet? **Do not** include white rice.							
14) Not including what you just told me about (lettuce salads, potatoes, cooked dried beans), how often did you eat **other vegetables**? (e.g. tomatoes, green beans, carrots, corn, cabbage, bean sprouts, collard greens, and broccoli) including any form of the vegetable (raw, cooked, canned, or frozen).		**O**	**O**	**O**	**O**	**O**	**O**
15) How often did you have Mexican-type **salsa** made with tomato?		**O**	**O**	**O**	**O**	**O**	**O**
16) How often did you eat pizza? Include frozen pizza, fast food pizza, and homemade pizza.		**O**	**O**	**O**	**O**	**O**	**O**
17) How often did you have **tomato sauces** such as with spaghetti or noodles or mixed into foods such as lasagna? Do not count tomato sauce on pizza.		**O**	**O**	**O**	**O**	**O**	**O**
18) How often did you eat any kind of **cheese**? Include cheese as a snack, cheese on burgers, sandwiches, and cheese in foods such as lasagna, quesadillas, or casseroles. Do not count cheese on pizza.		**O**	**O**	**O**	**O**	**O**	**O**
19) How often did you eat **red meat**, such as beef, pork, ham, or sausage? **Do not** include chicken, turkey or seafood.		**O**	**O**	**O**	**O**	**O**	**O**

During the past month…	Times (number)	Per Day 1	Per Week 2	Per Month 3	Never 0	Refused 99	Don't know 77
20) How often did you eat processed meat, such as bacon, lunch meats, or hot dogs? Processed meat: meats (usually read meats, but not always) preserved by smoking, curing, or salting, or by the addition of preservatives. Examples: ham, bacon, pastrami, salami, sausages, bratwursts, frankfurters, hot dogs, or spam.		**O**	**O**	**O**	**O**	**O**	**O**
21) How often did you eat **whole grain** bread including toast, rolls and in sandwiches? Whole grain breads include whole wheat, rye, oatmeal and pumpernickel. **Do not** include white bread. (You can tell me per day, per week or per month).		**O**	**O**	**O**	**O**	**O**	**O**
22) How often did you eat **chocolate** or any other types of **candy**? **Do not** include **sugar-free candy**.		**O**	**O**	**O**	**O**	**O**	**O**
23) How often did you eat **doughnuts**, sweet rolls, Danish, muffins, (pan dulce) or pop-tarts? **Do not** include **sugar-free items**.		**O**	**O**	**O**	**O**	**O**	**O**
24) How often did you eat **cookies**, **cake**, **pie** or **brownies**? **Do not** include **sugar-free** kinds.		**O**	**O**	**O**	**O**	**O**	**O**
25) How often did you eat **ice cream or other frozen desserts**? **Do not** include **sugar-free** kinds.		**O**	**O**	**O**	**O**	**O**	**O**

During the past month…	Times (number)	Per Day 1	Per Week 2	Per Month 3	Never 0	Refused 99	Don't know 77
26) How often did you eat popcorn? **Include** low-fat popcorn.		O	O	O	O	O	O