

UNDERSTANDING LATINO FAMILIES' FOOD AND HEALTH BEHAVIORS: A MIXED
METHODS STUDY

by

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A Thesis submitted in partial fulfillment of the requirements for the degree of Master of Science of Nutrition at George Mason University

by

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Dedication

This thesis is dedicated to my parents. For my Dad, who never ceases to inspire my love for nutrition and always encourages me to stand up for important issues that affect us all. For my Mom, who is the most caring and supportive person I've ever met. Your kind and generous demeanor is remarkable.

“I think we should all care about so many issues that don't affect us. That's the whole point of selflessness and being a human being, in the first place, is to care.” -Yves

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List of Abbreviations

American Medical Association.....	AMA
Block Food Frequency Questionnaire.....	Block FFQ
Body Mass Index.....	BMI
Calories.....	Kcals
Center For Disease Control	CDC
High-density Lipoprotein.....	HDL
Intervention.....	In't
Low-density Lipoprotein.....	LDL
Mason and Partner Clinic in Manassas, VA.....	MAP Clinic
Metabolic Syndrome.....	MetS
Multidisciplinary Research.....	MDR
National Institutes of Health.....	NIH
Non-alcoholic Fatty Liver Disease.....	NAFLD
Positively Fit.....	PF
Sugar Sweetened Beverages.....	SSB
Supplemental Nutrition Assistance Program.....	SNAP
The Theory of Planned Behaviors.....	TPB
The World Health Organization.....	WHO
Quality of Life Survey.....	QOL
Women, Infants, and Children.....	WIC

Abstract

UNDERSTANDING LATINO FAMILIES' FOOD AND HEALTH BEHAVIORS: A MIXED METHODS STUDY

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George Mason University, 2018

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Background: Low-income Latino children are disproportionately affected by obesity in the United States. Parents play a significant role in the treatment of childhood obesity. **Objective:** To evaluate the attitudes, norms, self-efficacy and behavioral intentions for healthy eating and management of childhood obesity in Latino families based on the Theory of Planned Behavior. **Design:** This research is a subset of a 10-week weight management intervention for Latino families with children above the 85th percentile for BMI. This mixed methods study had quantitative data that included Block Food Frequency Questionnaires (Block FFQ) and 24-hour recalls from the pilot cohort study, uncontrolled clinical trial (n=16 children) recruited from schools/clinics in Manassas, Virginia. Qualitative data included exit surveys and nine interviews with families. **Methods:** Pre and post-intervention Block FFQ and 24-hour recall variable changes were assessed. Interviews were analyzed using beliefs, values, attitudes, norms and behavioral intentions qualitative coding. **Results:** From the pre/post intervention

surveys decreases in whole milk, fruit juice, and trans-fat consumption were found while vegetables soup increased. Interview data identified significant barriers to Latino family health success around gender, family and self-efficacy. **Conclusions:** Qualitative and quantitative data from Block FFQ, 24-hour recalls, exit surveys, and interviews found that the intervention did not significantly affect measured food behaviors, but participants applied health knowledge from sessions. Consumption pattern changes were nutritionally favorable and reflected lesson plans. Participants conveyed changes in intentions, values, attitudes and beliefs toward healthy lifestyles, demonstrating possible future behavior change. Interviews helped to understand common factors for Latino health success.

Chapter 1: Literature review

Introduction

Obesity is a known problem that is dramatically affecting the United States and other countries around the world. When a person's weight is higher than what is considered healthy based on an individual's height it is categorized as overweight or obese, according to the CDC (Defining Adult Overweight and Obesity, CDC, 2016).

About two thirds of American adults are overweight and obese (NIH, 2017). This issue is also adversely affecting children. Childhood obesity is a growing issue that disproportionately affects ethnic minorities in comparison to their white counterparts. Latino children ages two to five are affected 4.8 times higher compared to non-Hispanic white children. Roughly 39% of Latino children and adolescents ages two to 19 are obese compared to 28.5% of whites (Skinner & Skelton, 2014). Latino-Americans are a growing population who are disadvantaged in many ways associated with increased rates of obesity in children, teens, and adults, including overall lower socio economic status and lack of health care access (Pérez-Escamilla, 2009).

As obesity rates climb in the United States and around the world, interventions with clearer protocols how to help lessen the issue are increasingly important (Lobstein et al., 2015). There is a lack of knowledge around how to treat obesity in children, especially in low-income Latino populations (Skinner & Skelton, 2014). This chapter

offers a detailed review of the predictors of childhood obesity and the health problems from being overweight specifically for Latino populations.

Demographics of Latinos.

Hispanic refers to ethnicities that are descendant of Spain and Spanish speaking countries whereas Latino refers to Spanish speaking people from Central and South America (Latin America) (United States Census, 2018). For the purposes of this paper, the terms Hispanic and Latino will be used interchangeably even though they have slight differences. In order to describe the population at large using both Hispanic and Latino terms are more inclusive and refer to the ethnicity of the individual compared to the region of origin of a person.

In 2013, in the United States, there were roughly 44 million Latinos with the majority being of Mexican origin (64%). The remaining Latino population immigrated from Central America, South America, and Cuba. In the state of Virginia, the majority of Latinos are of Mexican origin. The US census bureau reports that 40% of the Latino populations were born outside of the United States. In 2010, over half of the Latino population resided in three states: Florida, Texas, and California (Pérez-Escamilla, 2009). Relocation from Puerto Rico to mainland United States has also been steadily increasing over recent years. In 2014, over 84,000 Puerto Ricans moved to mainland United States, a 38% increase from 2010 (Krogstad, 2015). More Latinos have immigrated recently as a result of Hurricane Harvey and Hurricane Maria both occurring in Fall 2017. Between the years of 2000 and 2006, the Latino community was responsible for 50% of America's

population growth. Within the U.S., it is estimated that between years 2010 and 2050, Latino population will go from 48 million to 103 million people (U.S. Census, 2017).

When compared to Caucasians, Latinos encounter higher rates of poverty, food insecurity, depression, obesity, lack of physical activity and are diagnosed at higher rates with chronic conditions such as type II diabetes (Pan et al., 2012). Acculturation, the process by which Latinos adopt mainstream American attitudes, values, beliefs, customs and behaviors, is one factor contributing to this disparity (Pérez-Escamilla, 2011).

Acculturation.

According to Lindberg, Stevens, and Halperin (2013), the longer a Latino immigrant resides in the United States (U.S.), the prevalence of poor health behaviors increases. When Latino immigrants move to the U.S. they begin to adopt diets high in fat and low in fiber (Mexican Immigrant's Diets Raise Risks of Obesity, Heart disease, 2011). Further, immigrants living in the U.S longer than 15 years have a 4-fold greater risk of obesity than those living here less than five years (Lindberg, Stevens, & Halperin, 2013). As immigrants acculturate, they lose these health-protecting factors that they had when living in their origin of birth, including loss of cultural norms, religious customs and social support (Bhugra & Becker, 2005; Viruell-Fuentes, 2007).

Diets of Latinos.

Latino cuisine consists of an endless variety of dishes that are made with a common set of ingredients such as maize, yucca, chilies, plantains, squash, beans and rice. In the United States, many of the ingredients Latinos are accustomed to cooking with are unavailable (Pérez-Escamilla, 2011). Dietary acculturation is an intricate

process that can lead to both healthy and unhealthy dietary changes (Pérez-Escamilla, 2009). The unavailability of traditional Latino cooking ingredients can potentially lead to the adoption of American cuisine, which unfortunately may be highly processed, lack nutrient-density and be high in calories (Neff et al., 2009). Latino diets are also affected by food environment and financial stability.

Low Income.

Many nutrition and food-related behaviors contribute to childhood obesity. Low-income families in particular, struggle with having enough money to support their families. A lack of money limits what the family can afford to buy, and often families need to prioritize costs above healthful habits. Many low-income families also live in areas considered food deserts, areas devoid of access to fresh fruits, vegetables and other healthy whole foods, which then leads to increased reliance on fast food and quick marts, which are less healthy (USDA Defines Food Deserts | American Nutrition Association, 2010; CDC, 2017). A lack of healthy food options increases the risk of being overweight or obese.

Transportation and Low Income.

Transportation is the second largest expense for American families after housing costs, averaging around 20% of total income. For low-income families the cost for transportation is closer to 30% of income according to a survey from the Center for Neighborhood Technology. Many transportation options for low-income people are not affordable or efficient options (Chiodo, 2016). Poor public transportation and the lack of well-integrated employment opportunities for low-income people can impede the chance

to improve economic and social conditions. In areas that lack quality public transportation, job accessibility is in turn negatively affected. When quality public transportation becomes more accessible, the probability of being employed and the probability of working over 30 hours a week increases according to a study of workers that did not have vehicles in San Francisco and Los Angeles. Job accessibility is also less available to workers that do not have car access compared to workers that own vehicles (Kawabata, 2003). Transportation costs in low-income families are a large financial burden that may force families to make trade-offs between getting to work and being able to purchase healthier foods.

Food Environment and Low Income.

Transportation costs hinder the overall health of many low-income families as well as the food environment the population lives in. Food environment is the presence of food that affects a person's diet, where the proximity of grocery stores, distribution of food stores, food service and food access all impact a person's dietary habits (CDC, 2017). Food deserts are found at higher rates in areas where people of color and low-income people live (where many residents lack adequate transportation). Wealthy areas have been found to have three times more grocery stores than low-income areas. Supermarkets in low-income areas also tend to have less access to healthy food options and are flooded with highly processed fast foods, high amounts of sugars, fats, snack items and are devoid of fruits and vegetables (A Look Inside Food Deserts, CDC., 2017; American Nutrition Association, 2010).

Food environment is another significant factor that influences the health of low-income populations. Food accessibility and availability are important factors in the health outcomes of a population (Ahern, Brown, & Dukas, 2011). In one study conducted in 2008 in Baltimore, MD, food access was assessed in low-income minorities, predominantly African Americans, and found that healthy food options were not readily available. Fresh fruits and vegetables are not sold in many stores as shown by United States Census (CDC) results. Since many low-income people lack access to healthy foods what they do prepare tends to be higher in levels of fat and are less healthy. Corner stores are common places to purchase foods but lack healthier options. Many store owners are hesitant to stock healthy foods, even though research surveys found that customers were upset by a lack of healthy options in these quick marts (Gittelsohn et al., 2008). Local convenience stores have the ability to help change food environments for low-income residents by stocking healthier products and reinforcing healthy food messages.

Education in Latino Populations.

Not only is food environment an issue that affects the health of this population, but education is also another obstacle for low-income Latino families' health. In 1999, in the United States 23% of Hispanics lived in poverty compared to only 8% of non-Hispanic whites. In 2006, 56% of Hispanic adults over the age of 25 graduated from high school compared to 88% of non-Hispanic white adults (Escarce & Kapur, 2006). Over 66% of Hispanic adults that did not enroll in college stated that they joined the military or found a job to help support their family financially compared to 39% of white adults

(Krogstad, 2016). Only 15% of Hispanic adults ages 25 to 29 have graduated from a four year college compared to 41% of whites, 22% of African Americans, and 63% Asian Americans (Krogstad, 2016). It has been reported that 22% of Latino adults earned an associate degree compared to 60% of Asians, 46% of White and 31% of African American adults in the United States. While the number of Latinos attaining associate degrees increased 71% between 2004 and 2013, Hispanics still have lower education attainment than other populations (Santiago et. al, 2015).

Education and Obesity.

A lack of higher education for Latinos may be a large contributing factor to obesity. Higher education attainment may be correlated to better health outcomes according to research. Those who have less education and lower socio-economic status are more likely to be vulnerable to obesity and chronic diseases (Devaux et al., 2011). Haveman and Wolfe (2002) suggested that higher education is positively correlated with better health and overall well-being. In 2006, researchers Cutler and Lleras-Muney found that people who have finished more years of school are less likely to smoke, drink excessively, use illegal drugs or be overweight/obese. Those with more formal education were also less likely to live sedentary lives and be more active. People with higher education were also more likely to obtain preventative care such as vaccines, flu shots and colonoscopies (Cutler & Lleras-Muney, 2006). Formal schooling has been found to be one important factor correlated to good health (Smith et al., 2016). The amount of education correlates to obesity as a result of greater access to health information, increased self-efficacy to transfer that knowledge to action, more transparent

understanding of risks associated with lifestyle choices and obesity, and improved willpower and reliability of healthy choices over a period of time. A person's economic standing in society may also be a strong predictor of the access to resources needed in order to maintain a healthy weight (Devaux et al., 2011). The more a person is educated correlates to decreased risk for obesity since education leads to increased understanding of health risks, capability to apply learned health knowledge, and enhanced self-efficacy to make better food choices.

Access to Health Care in Latino Populations.

Obesity is not only an issue with Latino adults but a growing problem with Latino and Hispanic children as well. Low-income and education attainment are significant barriers to receive appropriate health care in Latinos. People of low socio-economic status are less likely to be able to pay out of pocket health care costs including co-pays and health care deductibles. Low-income Latinos typically have occupations that are associated with lower rates of health insurance coverage and higher rates of manual labor. Health care costs are much higher when a person lacks health insurance and is a financial obstacle when seeking health services. Features that affect Hispanic populations access to health care include degree of acculturation, language and immigration status. Over two-fifths of Latinos in the United States are immigrants who are primary Spanish speakers, with over one-fourth of the population reporting a lack of fluency in English. Latinos are also less likely to receive health insurance benefits from employers compared to non-Latino whites, which is the most common method of obtaining health insurance for working adults and their kids in the United States (Escarce & Kapur, 2006). Many

Latino families cannot afford to pay for health insurance, which makes treatment and care for obesity related chronic diseases more impactful (Vega et al., 2009). It has been reported that six-in-ten undocumented or non-citizen Hispanic adults living in the United States lack health insurance. Over 41% of these immigrants use a community clinic or health care center for their non-emergency medical care. U.S Department of Health and Human Services, (2008) reports that 37% of non-citizen Latino adults lack a primary health care provider. Over 28% of adults in this group indicate that finances are a limitation when it comes to obtaining a primary care provider. A lack of insurance is the main reason for over 17% of this group. Another 12% stated that high medical costs prevent them from seeking a consistent doctor (Livingston, 2009).

Prevalence of Childhood Obesity Among Latinos.

Latino children have among the highest rates of childhood obesity of any ethnic minority group in the United States, including African American children. In a national cross-sectional study, it was found that 26% of Latino children were obese at three years compared to 14.8% of Caucasians and 16.2% of African Americans. In a longitudinal study by Polk et al. in 2015, that examined early childhood weight gain in 210 Latino and 253 non-Latino children, researchers found that Latino children had higher incidence of early childhood obesity. The sample included low-income families who earn less than the federal poverty line and followed children from birth to three years and measured body mass index (BMI) and weight for length to analyze results. Latino boys were more likely to be overweight (25%) or obese (13%) than non-Latino boys (5.2%). Latino girls were more likely to be obese (17.2%) than non-Latino girls (5.6%). An increase in

weight to length ratio for children 0-3 years was linked with early childhood obesity in all the children, but was most significant in Latino boys who were 1.7 times more likely to be overweight and 2.5 times more likely to be obese than non-Latinos and Latino girls who were 3 times more likely to be obese than non-Latinas (Polk, Thornton, Caulfield, & Muñoz, 2016).

Physical activity is also an important aspect to target in the Latino population. It has been found that white students are more likely than black or Hispanic children to meet recommendations for daily physical activity. In 2015, only 24 and 25% of black and Hispanic youth met physical activity recommendations compared to 29% of white children. In young boys, white children were found to be the most likely to meet recommendations (at 39%) compared to Hispanics or black children (at 34 and 31%). Similarly, where white girls were found to meet higher percent of daily physical activity recommendations at 20% compared to 17% of Hispanic and 15% black girls (Roberts et al., 2016).

Risks of Childhood Obesity

Type 2 Diabetes Mellitus.

Childhood obesity is associated with significant long-term health effects and increased risk for chronic diseases such as type 2 diabetes, hypertension, dyslipidemia, metabolic syndrome and non-alcoholic fatty liver disease. Type 2 diabetes is a growing issue within the Latino community especially among Latino children. Evidence shows that obesity early in life is linked to type 2 diabetes later in adulthood (Park, Falconer, Viner, & Kinra, 2012). Diabetes has been found to affect Latinos at higher rates than

non-Latino populations. Latino adults are 66% more likely to have diabetes relative to non-Latino white adults. Consequences of childhood type 2 diabetes includes complications such as high blood pressure, high cholesterol, kidney disease, non-alcoholic fatty liver disease, skin conditions and many others (American Diabetes Association, 2014). A systematic review of obesity interventions in Latino populations concluded that 45% of new diabetes diagnoses are within Latino children in the United States, since Hispanic children are at the highest rates for prevalence of childhood obesity (Branscum & Sharma, 2011). Children that are already overweight or obese are at higher risk for developing health conditions such as type 2 diabetes (Hecht et al., 2004).

Over 66% of Latino youth ages 0-19 have been estimated to have type 2 diabetes with highest rates among Mexican youth, accounting for 50% of Latinos. Overall, 0.7% of children less than 10 years old, 14.5% of adolescents aged 10 -14 years and 28.7% of 15 to 19-year old children were diagnosed with type 2 diabetes. Incidence of type 2 diabetes for girls ages 10-14 was twice as prevalent as that of males ($P < 0.005$) while youth ages 15-19 found that type 2 diabetes exceeded type 1 diabetes in females ($P < 0.05$) (Lawrence et al., 2009). Researchers found that over one third of the sample had a high level of poor glycemic control, elevated dyslipidemia with high LDL cholesterol and high triglycerides (high levels of fat in the blood) that were causes for concern. Concluding that low-income, higher BMI individuals and lower parental educated families have higher rates of diabetes (Lawrence et al., 2009).

Hypertension and Dyslipidemia.

In a 2005 study Jago et al., examined over 1,700 eighth grade American students aged 14-15 years old from minority groups including African Americans and Latinos to analyze blood pressure and lipid profiles. The study concluded that among this sample, 23.9% had high blood pressure, 10% had borderline LDL cholesterol and 13.3% had low HDL cholesterol. This study establishes being overweight during adolescence increases the risk of elevated lipids and blood pressure and shows the importance of screening overweight teens for elevated blood pressure and lipids (Jago et al., 2006).

Metabolic Syndrome.

Metabolic syndrome (MetS) is a cluster of conditions that have been found to increase risk of heart disease, stroke and diabetes. Having three or more of the following determines that an individual has MetS: high waist circumference, hypertension, hypertriglyceridemia, low HDL cholesterol and hyperglycemia. Metabolic syndrome is closely connected to being overweight and obese (NHLBI, NIH, 2018). About one third of Americans have metabolic syndrome with the highest prevalence among Latinos. MetS rates in Latino adults are more commonly established than rates in Latino children. For Latina women MetS rates ranged from 27% in South Americans to 41% in Puerto Ricans. Latino men MetS rates ranged from 25% to 55%. Heiss et al. (2014), found that Latinos who had MetS also had abdominal obesity, (96% of women and 73% of men) (Heiss et al., 2014). It is important to understand that obesity directly correlates with MetS and rates in Latinos are extremely high.

Metabolic syndrome in children is not yet well defined but predictors include: abdominal adiposity, dyslipidemia, hypertension, and insulin resistance. Children that are obese or overweight are likely to be overweight as adults. Obesity in adulthood puts individuals at risk for many health concerns other than MetS including type 2 diabetes and hypertension (NHLBI, NIH, 2018). Metabolic syndrome in children ages six to 10 years is diagnosed when children are obese (over the 90th percentile for waist circumference) and have risk factors that meet the adult metabolic syndrome criterion for triglycerides, HDL-cholesterol, blood pressure, and glucose concentrations (NHLBI, NIH, 2018). Prevalence for metabolic syndrome for adolescents from 1999-2004 was 4.5% where incidence increased with age. Rates among males were 6.7% higher than rates within females at 2.1% and were highest within Mexican Americans, 7.1% (Weiss et al., 2013).

Liver Disease.

Obesity during childhood also increases risks for other health detriments, including liver disease. Chronic liver disease has been found with higher incidence within Hispanic populations compared to their non-Hispanic white and African American counterparts. Not only is occurrence of liver disease more common in Latino populations but is also found to be more aggressive. Chronic liver disease is the sixth most common cause of death in Latinos, whereas it is the tenth most common for non-Hispanic whites. Non-alcoholic fatty liver disease (NAFLD) is when there is a buildup of excess fat in the liver, which is not caused by excessive alcohol consumption. When the liver consists of more than 5-10% of fat it is then considered a fatty liver (steatosis) (American Liver

Foundation, 2016). NAFLD is the most prevalent liver disease in Latinos, where it is 1.4 times more frequent in this population than non-Hispanic whites and 1.9 times more frequent than African Americans. Insulin resistance and obesity have a positive correlation with hepatic steatosis (NAFLD) in Hispanics (American Liver Foundation, 2017). Epidemiological variations in Latinos show a higher prevalence of MetS, which may account for higher rates of NAFLD. NHANES data suggest that MetS has highest rates within Hispanics. Insulin resistance is associated with hepatic fat content in Hispanic populations (Carrion et al., 2011). Hispanic adults are at a disadvantage with regards to NAFLD incidence and are more likely to develop liver disease with increases in obesity and insulin resistance because of a genetic predisposition. Children that are already struggling with obesity are more likely to be susceptible to NAFLD compared to normal weight children (Children's Liver Disease Foundation, 2018).

Asthma.

Asthma is the chronic inflammation of the lungs, which narrows airways and currently affects over seven million children in the U.S. (NIH, 2014). Asthma is one of the most common diseases that plagues children and disproportionately affects minorities, including Latinos and African Americans with 30% of children ages four to seven diagnosed (Hunninghake, Weiss, & Celedón, 2006). The correlation between obesity and increased risk for asthma is clear. Children that are obese have more adipose tissue, which releases pro-inflammatory cytokines that cause narrowing of the airways (Barnes, 2008). Studies from the NIH have found that obesity may decrease lung volume in adults, but the effects of obesity on asthma is unclear in children since studies focusing

on asthma and lung volume have only been linked to adults. Obese children are more likely to eat diets high in omega-6 fatty acids and diets higher in fat. High fat meals induce inflammatory airway changes and decrease lung function. One recommendation to aid with obesity and asthma is to lose weight (Novosad et al., 2013) and have a healthier omega-3 to omega-6 fatty acid ratio. While studies primarily focus on adult weight loss, child weight loss is still encouraged in regard to obesity and asthma (NIH, 2014).

Depression.

Health problems correlated with obesity may also include depression, and negative social connotations. Depression is considerably linked to MetS, and dyslipidemia in adult Latinos with diabetes (Cardenas et al., 2017). Children that are overweight and obese are at higher risk for developing psychosocial issues within their peers and are more likely to be socially marginalized (Strauss & Pollack, 2003). These children are also likely to have fewer friends than children of healthy weights and have more difficulties with friendships. Children that are overweight are likely to be harassed, bullied and teased about their physical appearance by their peers, which causes psychological stress (Strauss & Pollack, 2003). A meta-analysis study showed that stigmatization of obese and overweight children has doubled in the last 40 years (Latner & Stunkard, 2003). The researchers observed 458 5th and 6th grade children from upper-middle and lower-middle incomes. Researchers asked children to rank pictures of other children who were obese on a scale of how much they liked the other children to understand how the children felt about obesity. Researchers found that present day

children ranked the pictures of healthy weight children significantly higher than the children in 1961. Since 1961, the difference between liking the healthy and overweight child has increased 40.8% showing that stigmatization of obesity in children has increased over the past 40 years (Latner & Stunkard, 2003).

Social Effects of Childhood Obesity.

Children between ages four to nine are in the beginning stages of their education. Starting school introduces a new social factor into a child's life. At this age, physical appearance may not be a priority, however, as children age it becomes much more significant. Not only can obesity cause physical issues, but social issues may also arise. A child who suffers from obesity will be at higher risk for being bullied in social settings, which in return can lead to problems with emotional development, and self-esteem (Strauss & Pollack, 2003). Other social issues associated with childhood obesity included poor academic performance, decreased overall well-being, and lower quality of life since obesity increased risk of co-morbidities including issues with vascular and hepatic health (Sahoo et al., 2015). Childhood obesity treatment is very important since children that are obese by the age of five are significantly more likely to be obese in adulthood (Lifshitz, 2008).

Importance of Cultural Adaptations.

Obesity interventions that incorporate the population's culture, norms and values may lead to better retention and participant acceptance and therefore, increase program effectiveness. Yet, a meta-analysis, by Bender and Clark (2011), on childhood obesity interventions focused on young minority children found a lack of culturally adapted

interventions. Simply translating documents to the participant's native language will not suffice. It is important that the information delivered is specific and adapted to the culture, beliefs, and attitudes of the target population. Researchers found a lack of studies surrounding cultural adaptations with interventions in young obese minority children where many studies were purely translated to the designated language and had significant bias (Bender & Clark, 2011).

A 10-week intervention study by Falbe et al. in 2015, with 55 low-income Latino children aged five to 12 who were overweight/obese (>85th percentile BMI-for-age) included a parent-multidisciplinary component and culturally adapted approach (Falbe et al., 2015). Weekly sessions covered nutrition, physical activity, screen time, healthy beverages, and stress due to immigration. The study reported intervention children BMI decreased by -0.50 kg/m^2 and control children BMI increased by $+0.32 \text{ kg/m}^2$. Intervention children showed improvements in BMI along with healthy reduction of triglycerides levels (-0.26 mg/dL). However, the study suggested long-term interventions are necessary to determine impact (Falbe et al., 2015).

Similarly, Guzman et al. (2012), found that when studies included a culturally adapted multidisciplinary approach, retention rates increased (70% retention over the course of the one-year program). Using a multidisciplinary approach for families the program Brenner Fit (Families in Training) targeted obese Latino children ages two to 19 above the 95% for BMI and their parents. Many allied health care professionals were included: dietitians, family counselors and physical therapists treated the families. Latino family participation for community weight management interventions increased after

materials were culturally adapted, families were encouraged to meet in person and were given interactive phone support (Guzman, Irby, Pulgar, & Skelton, 2012).

Treatment Guidelines for Childhood Obesity.

Children that are obese should receive treatment as early as possible since the longer a person is obese the greater the risk for coinciding health problems. Treating a child for overweight and obesity at a younger age increases chances of the child developing healthy habits for eating and overall lifestyle. Treating a child early helps build long-term physical and mental health stability. Childhood obesity increases social burdens that have lasting effects on self-esteem, body image and economic mobility (Must & Strauss, 1999). Treating childhood obesity early is imperative since that obesity is likely to persist into adolescence and adulthood (Whitaker et al., 1997). Treatment of childhood obesity should include parents, be patient centered and take medical history of the family into account (Barlow, 2007).

Treatment guidelines for childhood obesity varies based upon the severity of obesity and age (Barlow, 2007). Guidelines for children ages two to five depend on their BMI percentile. Children within 85-94th percentile are encouraged to maintain current weight until their BMI drops below the 85th percentile. Children above the 95th percentile are also encouraged to maintain weight until their BMI drops the 85th percentile. Whereas children that have a BMI above 21/22 (very rare) are recommended to gradually lose weight, no more than one pound per month. On the other hand, children ages six to 11 years old within the 85-94th percentile for BMI are recommended to maintain weight and watch their BMI percentile. Children within the 95-98th percentile should gradually

lose no more than one pound per month. Children above the 99th percentile should lose weight, where weight loss should not exceed more than two pounds per week (Krebs et al., 2007; Barlow & Dietz, 1998). Using BMI to quantify a child's weight may not be the most accurate since body fat is not analyzed directly, but has been clinically validated (Must & Strauss, 1999).

Prevention and treatment of childhood obesity follows a 4-step approach based on The World Health Organization (WHO) guidelines and American Medical Association (AMA) recommendations (Barclay et al., 2008). The first stage encourages prevention. During this stage children are recommended to eat five or more servings of fruits and vegetables, watch less than two hours of TV, have family meals majority of nights, limit meals outside the home, do not consume sugar sweetened beverages (SSB), exercise at least 60 minutes per day and have the child self-regulate their hunger cues and satiety (Barlow, 2007; Barlow & Dietz, 1998; Education, 2001). The second stage, structured weight management develops a low energy dense and balanced meal plan where the child increases structured meals and snacks, increases physical activity, limits TV, and learns to regulate their self-monitoring in regard to physical activity, screen time and dietary intake (Barlow, 2007; Barlow & Dietz, 1998). Lastly, a comprehensive multidisciplinary intervention where nutritionists, physicians, and behavioral health experts are included, and tertiary care intervention is reserved for children, who are severely obese, is implemented. This stage is implemented for children who have not had success in the first two stages. Stage three contains a family based approach, which gives parental training, has dietary counseling and nutrition education, increases physical

activity while reducing sedentary behaviors, and contains behavioral counseling, which includes self-monitoring, goal setting and incentives to change (Barlow, 2007; Barlow & Dietz, 1998).

Interventions for Treatment of Childhood Obesity

Family-Based Intervention Treatments for Childhood Obesity.

Family-based interventions have been shown to be more impactful in regard to childhood obesity. When parents and family members are involved they serve as role models for the children outside the intervention arena. Parents can help mold and cultivate children's eating behaviors and activity habits (Savage, Fisher, & Birch, 2007b). Parental influence is especially important with younger children since they have lower levels of control over their diets (Barlow, 2007). In one study by Savage et al. (2007), where parents and children were incorporated into a weight loss program it was found that parents helped to reinforce child behavioral change and weight loss. Groups that had parents and children work together over the course of a five to 10 year span showed higher amounts of weight loss compared to the control group, which did not encourage collaboration (-11.2% and -7.5% respectively) (Leonard H. Epstein, Valoski, Wing, & McCurley, 1990). Parental figures modeled how to eat and behave in activities to their children. It is clear that the skills of parents are the foundation for success during interventions that aids in the increases in their child's activity level and reduction of high-fat, high-caloric foods. Ongoing family support is crucial for the success of the maintenance of healthy habits after weight-management programs (Barlow & Dietz, 1998).

A 10-year randomized control trial intervention by Epstein et al. (1994), which involved parents, showed that obese children decreased weight by 34%. The intervention group, which incorporated parents had more significant weight loss compared to those who did not receive the intervention (i.e. parents were allowed to let their children freely choose their diet and amount of exercise) (L. H. Epstein, Valoski, Wing, & McCurley, 1994). The importance of parental role modeling and support when the child was encouraged to change their dietary and physical activity practices was shown. In another study by Golan et al. (1998), with 60 obese children aged six to 11 over the course of one year, parents were used as the sole agents of change to better understand the impact of parental support during childhood obesity treatment. In the experimental group where parents were the agents of change weight loss was $P < 0.03$ significantly higher, (14.6%) compared to the control (8.1%) (Golan, Weizman, Apter, & Fainaru, 1998).

Previous intervention studies that have been effective are summarized in Table 1. Involvement of parental/adult role modeling of healthy lifestyles was key (Flodmark, Ohlsson, Rydén, & Sveger, 1993; Savage, Fisher, & Birch, 2007a). Interventions in schools with nutrition knowledge and increases in physical activity were most effective (Simons-Morton, Parcel, Baranowski, Forthofer, & O'Hara, 1991). Finally, nutrition education for children leads to increases in healthy diets and food choices. Nutrition information is important in the treatment of childhood obesity. Diet is a lifelong habit that needs to be cultivated at a young age. Good nutrition practices can prevent health problems and increase quality of life (Population & Gilford, 1988).

A previous study with predominately Mexican American children concluded that acculturation was not directly correlated with obesity, but longer hours of screen time and the consumption of SSB's were highly correlated to obesity (Ariza, Chen, binns, & Christoffel, 2004). Nutrition education is important for children to learn when they are young to develop self-efficacy in regard to healthy food choices. Many families lack nutrition education and then are unable to feed their children nutritious foods, which leads to childhood obesity (Savage et al., 2007a). Parent-child dyads with children aged six-11 above the 85th percentile for BMI found statistically significant decrease BMI z-score compared to the control group. The intervention was conducted over the course of six-months with two groups parents only and parent with child with combination of individualized/group sessions. There were 16 1-hour support and education group sessions and six 40-50 minutes individual sessions held once a month. A clinical dietitian and family therapist led the lessons. Anthropometric measurements were taken at baseline, six, and 12 months and end of program. Obesity decreased by 29.5% (0.4 BMI z-score; $P=0.003$) in the parents only group compared to 22.4% (0.1 BMI z-score) in the parent-child group. Statistical significance was seen between both groups with changes in obesity and BMI z-score. This intervention included both parents and children in lessons, which showed success with BMI and obesity results post 6-month intervention (Flodmark et al., 1993).

With obesity interventions it is important to give families dietary education to help guide them to healthy lifestyles to prevent disease (Population & Gilford, 1988). In addition, parents may not identify their child as overweight, as per a previous study only

40% of Latina mothers of obese children assessed their child as overweight hence, information on pediatric obesity and associated risk is important to transmit to this population (Ariza et al., 2004).

Physical Activity Interventions for Childhood Obesity.

The Heart Smart School Health Promotion intervention was established to encourage elementary youth to become more physically active and increase cardiovascular health. Child participants had greater improvements in health knowledge than nonparticipants and also found that healthy school lunch choices were successfully changed and improvements in run and walk performance were seen. Students had positive health outcomes such as increases in HDL cholesterol (Heart Smart School Health Promotion, 2007).

Another intervention aimed to improve cardiovascular health and sought to reduce participants' daily intake of sodium to 3 grams, fat intake to 30% of total kcals and also to increase daily physical activity of participants. Mexican and Anglo-American families with grade school children between fifth and sixth grade were of focus. The one-year program contained 12 weeks of intervention followed up by six maintenance sessions over the course of nine months. Families participated in 90-minute workshops that focused on self-monitoring, goal-setting, problem solving, self-rewarding goal achievement and provided support. Meetings consisted of physical activity where afterwards parents and children dispersed and learned new information and skills separately. After the information session, families reconvened to set short-term dietary, exercise and family goals. Two hundred and six families participated and were given

healthy snacks after each 90-minute session. The treatment group, excluding the Mexican American boys, had significantly healthier diets than the control children three-month post intervention. Anglo women and Mexican American girls from the treatment group also were found to have healthier diets than the control group. Significant intervention versus control differences ranging from 2.2 to 3.4 mmHg systolic and/or diastolic blood pressure were found in all groups. Taking a multidisciplinary approach to prevention showed significant results (The Family Health Project, 2007).

The Heart Smart cardiovascular school health program targeted overall school environment with a multidisciplinary approach, which combined the implementation of changes to school curriculum, school lunch and physical education. The school lunch, which now focused on cardiovascular health, reduced fat by 30%, and sugar and sodium by 50%. Physical activity promoted individual fitness and conditioning. Children were also screened for cardiovascular risk factors and measured fasting lipids, lipoproteins, anthropometrics and blood pressure. Changes in cardiovascular risk factor changes, school lunch choices and exercise were compared to understand outcomes. Participants that were screened were found to have improvement in health knowledge compared to the nonparticipant control group. School lunch choices were changed with cardiovascular health in mind, where children who consumed the new lunch showed an overall cholesterol reduction. Overall, the intervention improved participants' physical activity performance, which correlated to increased cardiovascular health in the future. HDL cholesterol increased at intervention schools concluding a relationship between

behavioral change in school health and reduction of cardiovascular risk profiles (Arbeit et al., 1992).

In 2013, one study was conducted and consisted of children and parent dyads. Groups received six weeks of family-centered primary care-based interactive group lessons with a focus on healthy behaviors for nutrition, activity, stress management, and culturally sensitive coaching to encourage families to increase learned behaviors and address social barriers for lifestyle changes. Measurements included nutrition knowledge and intake, psychometric values, body composition and metabolic measures. BMI z-scores did not change significantly between groups and no change was found within metabolic measures between the two groups. The control group had an average 1.6-minute decrease in daily activity while intervention participants showed a 4.8% increase (Boudreau et al., 2013).

A family based-group intervention with children above the 95th percentile had 93 families participate over the course of 26 months, in 2011. The Positively Fit (PF) intervention comprised of 17 treatment groups of three to eight families who were block randomized to the PF treatment or a short family intervention over 26 months that were a behaviorally based group intervention for families and their children. Measurements included BMI and a quality of life (QOL) survey. Control group had three 60-min individual face-to-face visits with a registered dietitian; intervention had 10 weekly group treatment sessions at 90 min each: nutrition/physical activity counseling, behavioral therapy, and goal setting. A significant reduction in BMI z-scores at post-treatment for the PF group vs. controls. Children that were seven to 12 years showed a decline in BMI

while adolescents showed a significant increase. No difference in QOL survey results was seen. At the 1-year follow up, 41% of subjects achieved clinically significant BMI z-score decreases (Steele et al., 2011). This intervention showed that when families are included in education with their children weight loss is more successful over the course of time.

There is a lack of literature information surrounding childhood obesity treatments among Latino children. Overall, childhood intervention studies are limited and primarily focus on middle-income white adolescents. Published obesity studies seldom focus on family importance and cultural adaptations with recent immigrant Latino minorities. Central and South American children that have recently immigrated to the United States face unique challenges with maintaining healthy weights and are prime candidates for participation in multidisciplinary, family-based nutrition and health programs. To improve treatment of low-income Latino childhood obesity there should be an increase of culturally adapted, family-based interventions, which will fill a void in the literature.

Table 1. Previous effective childhood obesity intervention studies:

Study	Participants	Program/Site	Results
Prevention Programs			
Heart Smart School Health Promotion, 2007	530 Elementary school students of middle-income families	Heart Smart School Health Promotion, Louisiana.	Participants had greater improvements in health knowledge than nonparticipants. Increases in HDL cholesterol was observed

The Family Health Project, 2007	206 Mexican and Anglo-American families with children grades 5 and 6	Various United States Schools	The Family Health Project found significant intervention vs. control differences ranging from 2.2 to 3.4 mmHg systolic and/or diastolic blood pressure were found in all groups
Arbeit et al., 1992	556 students, Grades 4 and 5	Heart Smart Program: various school environments	Relationship between behavior change achieved in school health promotion to reduce cardiovascular risk profiles, finding increases in HDL cholesterol
Resnicow, Cross, & Wynder, 1993	376 students, Grades Kindergarten to 6	Know Your Body: 5-year program for elementary school children addressing healthy lifestyles	Treatment over the 3-years had an effect ratio of 48% with regards to BMI, skin folds and fruit/vegetables knowledge in 19 of 40 variables
Simons-Morton et al., 1991	1,156 students, Grades 3 and 4	Go for Health: focused on classroom-based health education/PE	Children's physical activity increased, children were active for 40% of PE class time, compared to 10% of control schools
Treatment Programs			
Family Based Individualized with a Registered Dietitian			
Flodmark et al., 1993	33 children and parent dyads, children ages 6-11; BMI > 85 th tile	6-month intervention with two treatment groups: parents only and parent with child with individualized/group sessions	Decrease in overweight at 29.5% (0.4 BMI z-score; P1/40·003) in parents-only group vs. 22.4% (0.1 BMI z-score) in the parent-child group
Boudreau et al., 2013	41 parent-child dyads, children 9-12 years old; BMI>85 th tile, 100% Latino subjects	Children and parent dyads received 6 weeks of family-centered group lessons with a focus on healthy behaviors	Control group had 1.6-minute average decrease in daily activity while intervention participants showed a 4.8% increase

Family Based Group Setting			
Steele et al., 2011	93 parent-child dyads, children BMI>95 th tile	Positively Fit (PF) intervention had treatment groups of families who were block randomized to treatment or a short family intervention	Reduction in BMI z-scores at post-treatment of PF group vs. controls. Children 7-12 years declined in BMI. 41% of subjects achieved clinically significant BMI z-score decreases one-year post intervention

Chapter 2: Rationale, Objectives and Research Design

Rationale

It is important to focus on Latinos since they are a growing population in the United States with limited research surrounding their health and overall wellness needs. Obesity is a growing epidemic that effects over two thirds of United States adults (Overweight and Obesity Statistics, NIH, 2017) and is also negatively impacting children. Childhood obesity impacts minority groups, specifically Latino populations, at higher rates than other populations (The State of Obesity, 2014).

Rates of obesity are higher among Latino children compared to Caucasian children (Childhood Obesity Facts, CDC, 2017). Over 26% of Latino children ages six to 11 are obese compared to 11% of white children, and 16.7% Latino children ages two to five are overweight compared to 3.5% of white children (Skinner & Skelton, 2014). The prevalence of childhood obesity is a serious health concern, particularly in certain at-risk populations such as minorities and people of low socioeconomic status. Childhood obesity is linked to many health issues later in life including metabolic syndrome, depression, and type II diabetes.

Children, who are overweight and obese, are at higher risk for developing psychosocial issues compared to their normal weight peers and are more likely to be

socially marginalized (Strauss & Pollack, 2003). These children are also likely to have fewer friends than children of healthy weights and have more difficulties developing friendships. Children that are overweight are likely to be bullied regarding their physical appearance, which increases psychological stress (Strauss & Pollack, 2003). Since childhood obesity is a growing issue with Latino populations in the United States, it is important to gain clearer understanding of causes and how best to treat this population. This program sought Latinos since there is a lack of childhood obesity studies with this minority and aimed to fill a void in the research (Jelalian & Steele, 2008).

Objectives and Hypotheses

Objective 1: To describe participants of a 10-week weight management intervention and understand changes in dietary habits based on Block Food Frequency Questionnaires and 24-hour recalls.

Objective 2: To gain better understanding of how Latino attitudes, norms, beliefs, self-efficacy and behavioral control towards food affect behavioral intentions and actions based on The Theory of Planned Behavior.

Objective 3: To gain greater understanding of Central American Latino's culture, values, beliefs and American assimilation effects on dietary habits of participants who have participated in a 10-week weight management program for overweight or obese children.

Methods

Multidisciplinary Research Study a 10-week Weight Management

Intervention Outline.

This intervention is extremely unique since it targeted a low-income Latino population that focused on obese children, which is rare in the literature. The 10-week weight management intervention recruited 16 Latino children aged four to nine that were categorized as overweight or obese according to CDC growth chart guidelines. One eligible self-identified Latino child from each family was included and participated in the intervention. Children were recruited through local schools and medical clinics including the Mason and Partner (MAP) clinic in Manassas, VA. Children and their families participated in baseline and final assessments, before and after the completion of the 10-week intervention program. At baseline, families came to Manassas Park Community Center and had their child's BMI, waist circumference and height measured. A blood sample was collected pre and post-intervention for subsequent analysis of lipids, glucose and other biomarkers. Blood pressure was taken from the child. Families completed Parental Stress Index, demographic questionnaires, child behavioral questionnaires and Block FFQs and 24-hour recalls based on their child's diet.

Over the 10 weeks of lessons, parents participated in behavioral health and nutrition education while children engaged in structured physical activity. Lessons targeted the needs of this population to encourage healthier food behaviors (i.e. decreasing fast food, increasing fruits and vegetables). Parents were targeted during

lessons since they still have influence in the food young children eat particularly in low-income households (Savage et al., 2007a). Lessons focused on MyPlate recommendations and previous lessons that the USDA has delivered in aims of well-rounded nutrition information. Some lessons required visual aids while other lessons focused on handouts for participant interaction. Each lesson had interactive activities to encourage participation and application of knowledge. At every lesson, participants received handouts, which highlighted main points from each lesson and was added to their binders, which participants received at the start of the study. Lessons and objectives delivered can be seen in Table 2. Since this population primarily spoke Spanish, all lessons were translated and delivered in Spanish. For intervention success, it was imperative that there were multiple Spanish speakers available for translation of documents and during weekly lessons and meetings.

Table 2. Lesson plans for a 10-week MDR Study for Obese and Overweight Latino Children:

Lesson Week	Name of the Lesson	Lesson Plan Objective:
1	Living a healthy lifestyle	Participants will understand the benefits of living healthy and the importance of a healthy weight for the reduced risk of obesity related diseases (diabetes, CVD)
2	Physical activity and sedentary time	Participants will understand the benefits of increased physical activity and risks of sedentary lifestyles
3	Hunger cues, coping with urges and portion sizes	Participants will understand how to better identify their body's hunger cues, how to manage urges and what appropriate portion sizes are
4	Fruits and vegetables	Participants will understand the benefits of fruits and vegetables, servings sizes and fiber importance
5	Reading food labels	Participants will understand how to read a food label
6	Social gatherings	Participants will understand how to enjoy social gatherings while staying on a healthy lifestyle track
7	Eating on a budget and grocery store tour	Participants will understand how to eat healthy on a budget and how to shop each grocery store aisle with nutrition in mind
8	Decreasing fast food	Participants will understand how to decrease fast food and how to pick out the healthiest options at fast food restaurants
9	Meal planning	Participants will understand how to meal plan and the benefits of thinking ahead
10	Relapse/Lapse	Participants will understand that being healthy is a lifestyle where there may be setbacks where they will learn how to deal with them and stay on track

During the intervention children participated in physical activities while parents received weekly nutrition and or behavioral health lessons. Once the lesson was over families reconvened for a staff prepared healthy dinner. During this time, families

completed weekly goals together. Meals were culturally appropriate and came from Caribbean islands and Central and South America. Recipes focused on lean protein such as chicken, beans, fish. Dishes were high in vegetables and low in fats and often included brown rice and healthy soups. Along with the main entree, a fruit and salad buffet were served. No dessert or bread were delivered. Meal recipes were translated to Spanish and handed out with weekly lesson plan materials to be added to binders. To encourage weekly participant adherence incentives were included. One incentive to encourage attendance was a prize for the participants that attended the most number of sessions. One possible prize was a crockpot (since weekly meals served were cooked in crockpots).

This research is a subset of a larger Multidisciplinary Study with physical activity, behavioral health and nutrition components. This thesis solely focused on nutrition aspects from the larger study. Using mixed-methods, Latino food and health behaviors based on The Theory of Planned Behavior was explored. This study described participants of the 10-week weight management intervention to understand dietary changes based on Block Food Frequency Questionnaires and 24-hour recalls to understand parental knowledge nutrition-related behaviors of children. It also explored Latino attitudes, norms, beliefs, self-efficacy and behavioral control towards food and how that affects behavioral intentions and actions.

Research Design

The culturally adapted nutrition education program was explored to see if nutrition knowledge increased with Latino parents of obese and overweight children ages four to nine in the 10-week weight management program. Block FFQs (Appendix A) and 24-hour recalls (Appendix B) were analyzed pre and post-intervention to see if there was an increase or decrease in stated variables (fruits/vegetables, whole grains, skim milk, lean protein, saturated fats).

Parent exit surveys were administered post intervention to get a broad understanding of participant acceptance and attitudes about the program. Exit surveys (Appendix C) asked questions regarding participants' feelings about food served, lesson plans, suggestions for improvement, likes and dislikes of the program. Answers from questions were recorded in number and percentage forms to understand how the majority of participants perceived the intervention.

Semi-standardized interviews (Appendix D) with participants post-intervention helped to understand values and beliefs related to nutrition choices and influences. Interview questions were formatted based on The Theory of Planned Behaviors. Interviews gained clearer understanding of how Latino culture and values influence dietary changes and patterns. This research helps fill a void in literature and guides new Latino focused interventions with regards to the strengths and weaknesses of this program.

Participants.

The participants of this program consisted of a unique population of low-income Latino children ages four to nine with a BMI \geq 85th percentile, categorized as overweight/obese according to CDC BMI-for-age growth charts (CDC Growth Charts, 2000). Children included in the study self-identify as Hispanic or Latino and spoke Spanish or were comfortable with information given in Spanish. Participants were healthy and lacked any serious medical conditions. Pre-existing conditions such as diabetes, asthma, cancer or high blood pressure were grounds for exclusion from the study. Children were pre-pubertal since metabolic changes occur with puberty, which may affect outcomes of some children who are going through or have gone through puberty (Soliman, De Sanctis, & Elalaily, 2014). This study solely focused on children that are overweight but are overall healthy since the child participated in physical activity.

Children were recruited from multiple sites including, Mason and Partner (MAP) Clinic in Manassas where physicians made referrals and staff from the study personally recruited participants. Children were also recruited via neighboring schools with high Latino populations.

The cultural consideration of the intervention is important since there is an increased risk associated with the Latin American population in the United States with health concerns, including obesity, diabetes and cardiovascular disease. Countries of origin in the target audience include those located in Central and South America.

Immigration and integration of the two cultures, Latin and American, show increases in health related risk factors for these populations, as well as their likelihood to be living in a low socioeconomic environment (Ross & Bell, 2017). This study is unique since it incorporated many novel aspects. Not only did it include cultural considerations but targeted young Latino minority children from low-income families, which is rarely focused on in existing literature.

Data Collection

Mixed Methods Approach.

A convergent parallel mixed methods design was used, in which both quantitative and qualitative data were analyzed separately and merged to understand overall impact. Quantitative data including Block FFQ and 24-hour recall tests pre and post-intervention were analyzed using Wilcoxon Tests. Interviews utilized The Theory of Planned Behavior to analyze Latino attitudes, norms and behaviors to gain further understanding of how they influence their health and nutrition behaviors. Parental exit surveys were administered to gain further insight into the acceptance of the program with Latinos. The reason for collecting both qualitative and quantitative data was to converge results from both forms of data and to holistically understand participants of the 10-week weight management intervention and understand changes in dietary habits. This approach gained insight into this unique population to better understand Latino attitudes, norms, beliefs, self-efficacy and behavioral control towards food and how they affect behavioral intentions. Conducting interviews gained clarity to Latino culture, values, beliefs and American assimilation effects on dietary habits, which is rare in the literature.

Quantitative Data

Block FFQ and 24-Hour Recall Design and Collection.

During the baseline visit parents and guardians filled out paperwork that included Block FFQ and 24-hour recalls about the child's diet found in Appendix A and B. A Block FFQ recall is a limited food and beverage checklist that is two pages long and takes about 10-15 minutes to complete, which assesses how often a subject consumes a certain food over the past week. The Block FFQ Screener has been validated when analyzing the dietary intake in Hispanic women with regards to macronutrient distribution, saturated fats, fiber and cholesterol (Block, Wakimoto, Jensen, Mandel, & Green, 2006). Strengths of this survey include low cost and ease for researchers to collect the needed data; however, it relies upon the memory of participants, which can be difficult with children. The Block FFQ has been validated and used in many previous studies where total energy, protein, vegetables, fruits and various micronutrients have been of interest (Haftenberger et al., 2010; Kroke et al., 1999). Nutrition intervention studies have found that the Block FFQ can reasonably assess food consumption for different populations. The use of the Block FFQ for this intervention focused on variables in servings of fruit, vegetables, whole grains, consumption of reduced fat milk, lean protein and sugar sweetened beverages.

Twenty Four-Hour Food Recalls were assessed using the USDA Five-Step Multi-pass method that was developed by the Human Nutrition Information Service in aims of reducing underreports during the self-reporting stage of food intake (USDA Food and

Nutrition Service, 2016). Interviewers used the five distinct stages to recall participant's food intake over the preceding 24 hours (from midnight to midnight). The Principal Investigator of this 10-week weight management multidisciplinary study trained research staff to properly collect dietary recalls. Interviews were conducted with the child and a present guardian, based on a procedure to ensure accuracy of the recall (Johnson, Driscoll, & Goran, 1996). Participants provided data on food intakes with regards to intake, type and amount of specific foods. Plastic food models (Nasco, 2018) were also used to demonstrate portion size and aid in memory recall. Food menus from surrounding Manassas, VA elementary schools were also available for children and families to review if dietary recall was during a weekday. All 24-hour recall data was entered into Nutritionist Pro software (Axxya systems, 16932 Woodinville Redmond Rd NE, Suite A201. Woodinville, WA 98072) in order to calculate nutrients, calories and food group servings.

Statistical Methods.

The quantitative results were analyzed using SPSS Statistics software (IBM, version 24). Variables were checked using Wilcoxon tests for standard deviation and mean. Population characteristics were described using mean and standard deviation for continuous variables and proportion (%) for categorical variables. Changes in nutrition related behaviors (servings fruits/vegetables, sugar-sweetened beverages, etc.), based on the Block FFQ and 24-hour recall, were analyzed pre and post-intervention using paired t-tests. Overall calorie percentages for Block FFQ recalls were analyzed to understand

changes pre and post-intervention. Adjustments for multiple comparisons were made to analyze p-values, mean and standard deviation using multiple two tailed tests and non-parametric samples for p-values.

Qualitative Data

Exit Survey Analysis & Program Acceptability.

At the final assessment, families completed an exit survey in order for the researcher to evaluate the program's acceptability. The exit survey asked questions regarding lesson plans, instructors and food to evaluate how the participants felt about the program and helped to understand overall success of the program and what participants suggested changing for future programs. It consisted of four to five pages (10-15 minutes) with short answer and multiple-choice questions. Few questions were open ended. Questions were developed to gain understanding about participant acceptance and feelings about the program, perception of family health and ways to improve the 10-week weight management intervention. This exit survey will help inform future interventions based on what the participants liked, disliked and recommended. Participants could leave their address or a contact number if they wanted more information regarding aid or future studies. In addition, questions about cultural suitability and competence of the program were sought. To analyze the demographics, percent of the total (N) was calculated for each section and then assessed to understand each question.

The Theoretical Framework.

The Theory of Planned Behavior (TPB) suggests that beliefs, attitudes, norms and locus of control predicts intentions and behaviors. Based on this theory, behaviors produce a certain outcome. There are six main constructs of focus for the TPB, which include attitudes, behavioral intention, subjective norms, social norms, perceived power and perceived behavioral control (Ajzen & Fishbein, 1980; Fishbein & Ajzen, 1975). Attitudes focus on the individual's perception of a certain behavior of interest and the evaluation of the expected outcomes of performing the behavior. Behavioral intention refers to the motivational factors that may encourage a certain behavior to be performed where the stronger the motivation the more likely the task will be accomplished. Subjective norms are the belief about others approval of the behavior at hand and takes into account whether an individual's peers think they should engage in said behavior. Social norms focus on the unwritten codes of certain behaviors in a group situation where the proposed codes are normal and standard for the set of people. Perceived powers are the outside factors that may affect behavior accomplishment, which contribute to an individual's behavioral control of those factors. Lastly, perceived behavioral control is the perception of how easy the performance of the behavior of interest is completed (Ajzen & Fishbein, 1980; Fishbein & Ajzen, 1975).

Though the TPB has been helpful for researchers in many settings there are limitations. This theory assumes that the individual in question has acquired needed opportunities and resources for success with regards to the behavior at hand regardless of intention. The TPB does not account for other variables with behavioral intention such as

threats, fear, mood and past experiences. Environmental and economic factors are not taken into account and assumes that behavioral decisions made are through a linear process and do not change over time. This theory does not mention controls over behaviors and the time between intent and action with behaviors is unclear (Ajzen & Fishbein, 1980; Fishbein & Ajzen, 1975).

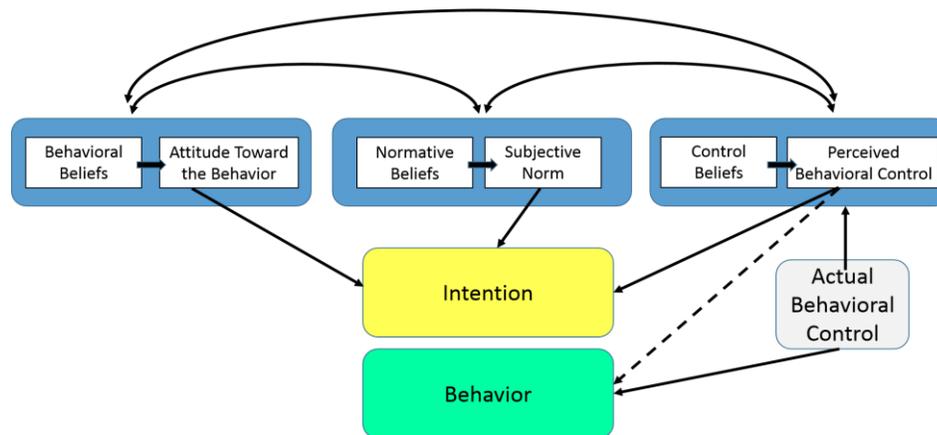


Figure 1. Theory of Planned Behavior Model

Source: LaMorte, W. W. (2016). The Theory of Planned Behavior. Retrieved from <http://sphweb.bumc.bu.edu/otlt/MPH-Modules/SB/BehavioralChangeTheories/BehavioralChangeTheories3.html>

Design and Collection.

Data for this exploratory study was driven from a semi-structured interview with participating Latino mothers conducted from October to December 2017, after the 10-week weight management intervention. Interviews were conducted in person with a Spanish translator and researcher. Eight of the nine interviews were conducted in Spanish, where one interview was conducted in English. Many women brought their

children with them. To increase rapport and comfort bottles of water and apples were provided.

Interviews lasted about 60 minutes in length, ranged from 15-20 questions and were audio recorded so that the researcher had the most accurate notes. Interview questions were developed based on TPB and focused on beliefs, behaviors and attitudes and behavioral intentions (Ajzen & Fishbein, 1980; Fishbein & Ajzen, 1975). Semi-standardized questions were reworded, and language was changed based on participants allowing for clarification (Berg, 2009). The interviewer could answer questions and clarify if necessary. The interviewer was allowed to add or delete probes of questions between subjects (Berg, 2009). The intention of the interview was to gain a clearer understanding of how the values and beliefs of the population influence behaviors and intentions surrounding health and diet. Questions surrounded self-efficacy, normative beliefs, attitudes towards behaviors, changes in diet since assimilation, post intervention changes surrounding diets, behavioral intentions and suggestions with regards to cultural sensitivities. Results were coded to find overall themes and trends in data. With a more defined understanding of how values and beliefs impact nutrition behaviors in Latino minorities a more culturally sensitive intervention can be designed and adapted.

After conducting interviews each woman was given a \$50 Walmart gift card. In comparison to the exit survey, interviews allowed for deeper clarification with participant values, beliefs and culture so that future studies can be more sensitive to this population's strengths, weaknesses and cultural needs. Feedback from these interviews will aid in the formation of future obesity treatment program within this population. Long-term effects

of the study also become clear after interviews. Qualitative data from interviews was compared to baseline information to understand results of the intervention.

Interview Analysis.

Interviews were recorded, transcribed, and translated from Spanish to English. Many participants solely spoke Spanish; therefore, the translator asked most of the questions based off of the interview script. Appendix D contains interview questions. But, if a participant was comfortable conducting their interview in English they were asked to proceed with the primary researcher. Interviews were coded using NVivo 11.3.4. Coding was performed by reading through each transcript and applied a coding framework based on The Theory of Planned Behavior. The framework reflected participants' attitudes, norms, behavioral control, intention and behaviors. In order to build a framework a coding map of TPB was laid out. Categories included: beliefs, attitudes, food environment, self-efficacy, norms, values, intentions and health behaviors. Once these categories were defined the codes were then established. Beliefs were broken down and then had sub-categories of food environment and values. Beliefs filtered into attitudes and self-efficacy filtered into norms. Self-efficacy also had a sub-category of lack of control. Finally, norms led into intentions. All categories lead to potential future health behaviors. The codes and categories used can be seen below in Figure 2.

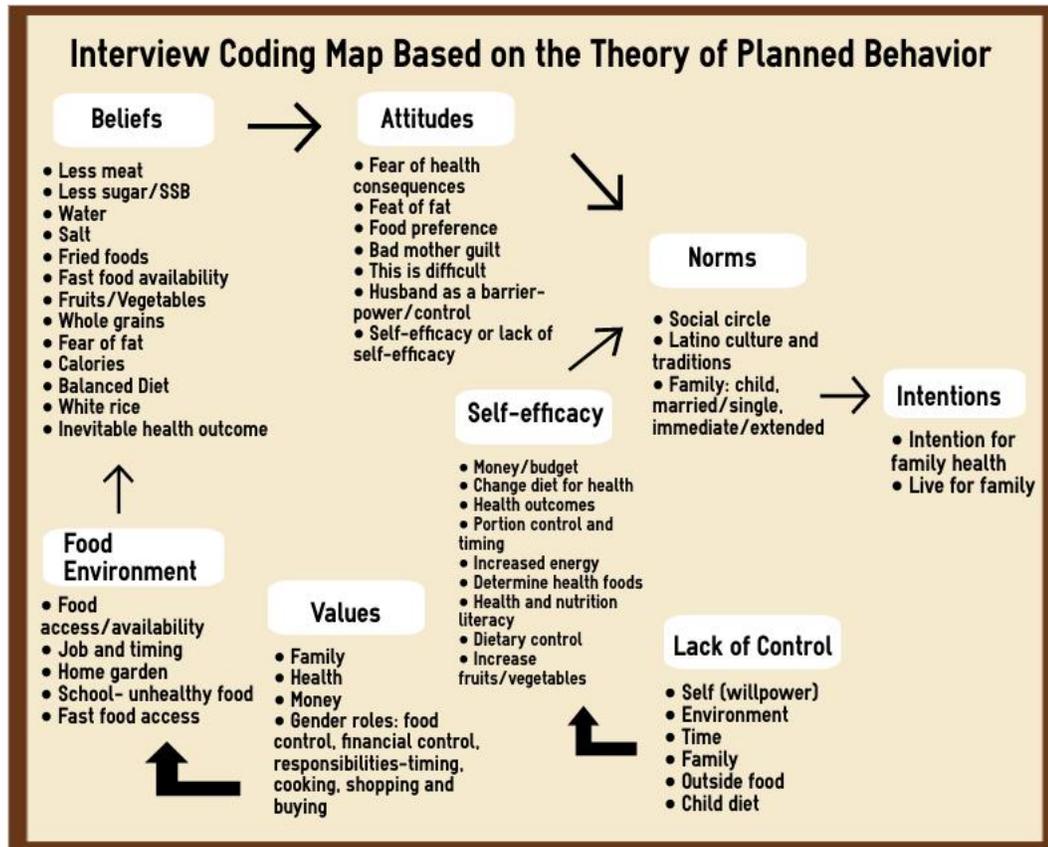


Figure 2. Interview Coding Map Based on the Theory of Planned Behavior

Chapter 3: Findings and Interpretations

Block FFQ

At baseline 16 Latino children were enrolled in the program of which 11 (68.8%) completed the intervention. All children that enrolled in the intervention were eligible for participation based on exclusion/inclusion criteria. Thirty-Five Block FFQ variables were evaluated using a Wilcoxon test via SPSS to determine mean and standard deviation, variable changes for Block FFQ are seen in Table 3. Variables that changed included whole milk, fruit juice and vegetable soup. Whole milk consumption decreased from a mean of 85.8 grams pre-intervention to 44.7 grams post-intervention. Fruit juice consumption decreased from a mean of 85.94 grams to 55.1 grams. Vegetable soup increased from a mean of 2.3, times per week, to 3.2 mean.

Block FFQ data showed decreases for whole milk and fruit juice and increases for vegetable soup consumption pre and post-intervention. The 24-hour recall showed a decrease for trans-fats intake. Qualitative and quantitative data align since interview participants frequently mentioned that post-intervention they were now increasing healthy food consumption in their homes. All mothers stated that fruits and vegetables were healthy and commented that after the intervention they were increasing fruits and vegetables with all meals, validating the significant increase of fruits and vegetables based on the Block FFQ results. Mothers during interviews did not mention that they

were decreasing whole milk intake, which was found in the Block FFQ. The 24-hour recall found that parents decreased the amount of trans-fats in their children's diets, which correlates with interview responses. All interviewees mentioned that they were decreasing fat in their diets in relation to fast food consumption, foods that were greasy, oils used during cooking and reduced fried foods in their diets. While it was mentioned that fat was lessened in their diets, trans-fat specifically was not a topic that was reported, although interviewees expressed fears around dietary fat. Both qualitative and quantitative results mirror each other based on variable changes and what was discussed during interviews.

Before the intervention began Block FFQ reports showed that the children's diets consisted of many beverages including; whole milk at 85.8 grams per week, soda at 92.9 grams per week and fruit juice at 85.9 grams per week. Fruits that were often consumed pre-intervention included: apples at 4.6 times per week, applesauce at 2.3 times per week, and other fruit at 3.5 times per week. Children also frequently consumed: macaroni and cheese at 1.4 times per week, cookies at 2.1 times per week, pizza at 1.8 times per week and whole wheat bread at 2.1 times per week. After the intervention, the Block FFQ showed that the children's diet consisted of whole milk at 44.7 grams per week, soda at 41.4 grams per week and fruit juice 55.2 grams per week. Fruit consumption was reported that apples were eaten 5 times per week, applesauce at 3.2 times per week, and other fruit at 3.8 times per week. Macaroni and cheese post intervention was reported at 1.5 times eaten per week, cookies at 1.6 times per week and whole wheat bread at 1.5 times per week.

Table 3. Block FFQ Results in 16 Latino Children above the 85th percentile for BMI, Pre- and Post a 10 Week Weight Management Intervention (in 't):

Variables (F-frequency - servings over the past week)	Pre in't Mean N = 16	Standard deviation	Post in't Mean N =11	Standard Deviation
Whole milk (g)	85.8	144.3	44.7	102.8
Soda (g)	92.9	92.2	41.4	110.1
Fruit Juice (g)	85.9	106.1	55.2	38.4
Apples (F)	4.6	1.3	5	1.3
Applesauce (F)	2.3	1.9	3.2	2.1
Other fruit (F)	3.5	1.8	3.8	1.7
Lettuce (F)	3.0	1.8	2.8	1.7
Other potatoes (F)	1.6	0.9	2	1.5
Green beans (F)	2.2	1.3	2.3	1.8
Pinto beans (F)	3.6	1.2	3.7	1.6
Other vegetables (F)	3.2	1.4	3.2	1.3
Refried beans (F)	2.6	1.4	2.1	2.0
Chicken (F)	3.0	1.1	2.6	1.5
Macaroni and cheese (F)	1.4	1.0	1.6	1.5
Vegetable soup (F)	2.3	1.0	3.2	1.3
Burritos (quantity)	2.1	0.3	1.9	0.5
Pizza (F)	1.8	1.2	1.8	1.5
Spaghetti (F)	1.7	1.2	1.9	1.5
Hotdog (F)	1.5	1.3	1.6	1.5
Whole wheat bread (F)	2.1	1.3	2.6	1.5
Cookies (F)	2.1	1.5	1.6	0.50
Sugar added (tsp.)	6.5	4.6	5.1	5.5
Legumes (cups)	0.2	0.1	0.2	0.1
Saturate fat (g)	13.7	8.3	13.5	15.1
Meat, poultry, fish	2.3	1.8	2.3	2.9
Fruit/ fruit juice (cups)	1.5	1.2	1.5	0.8
Whole grains (ounces)	0.5	0.4	0.5	0.4

Dairy (cups)	1.2	0.6	1.2	0.93
Kcals	1031	572	1000	961
Carbohydrates (g)	131.3	70.0	123.9	96.9
Fiber (g)	11.6	5.0	12.4	8.6
Sugars (g)	72.0	43.8	66.2	44.4
Sugary beverages (kcal)	0.3	0.3	0.1	0.3
Cholesterol (g)	152.2	142.4	128.3	150
Calcium (mg)	559.2	242.2	545.0	442.5

Fruit juice consumption decreased from 89.9 grams to 55.2 grams per week, a favorable nutrition outcome. Fruit juice consumed at higher amounts than recommended, can lead to excess calories and sugar intake, especially in children. Recommendations for fruit juice intake for a child is no more than 4-6 oz. per day. Fruit juice also lacks fiber where whole fruit is an all-around healthier option (American Academy of Pediatrics, 2017). Therefore, participants were encouraged to decrease fruit juice while increasing fruits and vegetables throughout the intervention, specifically expressed in Lesson #4.

Vegetable soup intake saw an increase over the course of the intervention from 2.3 times per week at baseline to 3.2 times per week post intervention. Every lesson reiterated the importance of fruit and vegetable consumption for overall quality of health, especially during Lesson #4 – Fruits and Vegetables. The increase in vegetables was an expected outcome and was nutritionally favorable.

Based on the 24-hour recall it was observed that trans-fat intake decreased from pre-intervention interviews from 0.7 grams to 0.2 grams both within the healthy range of less than 10% of total daily caloric intake (USDA Food and Nutrition Service, 2016). Trans-fats were discussed in Lesson #8 where participants were explained the health impacts of fats and how it was important to keep trans-fats low in their diets (HHS and USDA, Food and Nutrition Service, 2016). Due to a lack of a gold standard method when analyzing dietary intake, it has been found that FFQ's are typically used and validated with other reference intake methods including 24-hour dietary recalls (Fatimah et al., 2015).

Child FFQ seem to be more accurate than 24-hour recalls when recording nutrients for 3 to 11-year old children, but tends to underestimate intake in children 12-16 years old. Current FFQ should be modified to increase accuracy in children 12-16 by developing a new revised version, which will more accurately assess child's dietary intakes (Kobayashi et al., 2011). Kobayashi (2011) found it common for children to under or over report nutrients. In 2016, Zhang found that Block FFQ and 24-hour recalls in children found consistent underreporting of dietary intake with FFQ's compared to reasonable estimates based on 24-hour recalls. Adolescents and youth commonly underreport dietary information since youth tend to have less structured eating patterns, underreporting is in line with expectations. Children tend to lack adequate knowledge of the food they consume with regard to preparation and estimation of portion sizes. Parents may often serve as proxy reporters for young children to increase accuracy and reduce the limitation of underreporting. In child populations the use of proxy reporters may help

reduce limitations and ensure reasonable estimates for dietary intakes of children (Zhang et al., 2016). There is no gold standard for dietary recall in children, but Block FFQ seem to have consistently higher accuracy than 24-hour recalls in many studies (Livingstone et al., 2004; Serdula et al., 2001). Many times, children under-report their nutrient intake, where it is probable that underreporting also occurred for the 10-week weight management intervention results and may have altered significance of data.

Nutrient Intake Recommendations for Children.

Children of ages four to nine should consume about 130 grams per day of carbohydrates (45- 65% total kcals). Fiber consumption should be at least 25 grams per day. Added sugars should be less than 25% of total kcals per day. Protein should consist of about 19 grams per day and range from 10-30% of total kcals. Fat should range from 25-35% total kcals per day. Saturated fat should not consist of more than 10% total kcals for children. Trans-fats should be kept as low as possible and may range up to 5-6% of total kcals (Dietary Guidelines for Americans, 2015-2020).

Pre-intervention the Block FFQ showed the children ate 131.3 grams of carbohydrates per day and post intervention the Block FFQ showed that children were eating about 123.9 grams of carbohydrate per day compared to 130 grams per day recommendation. Fiber consumption was reported at 11.6 g per day pre and 12.4 g per day post compared to the 25 grams per day recommendation (Dietary Guidelines for Americans, 2015-2020). Added sugar intake pre-intervention was at 72.0 grams and changed to 66.2 grams per day post-intervention.

24-Hour Recall

Twenty-Four Hour Recall results were calculated using SPSS with Wilcoxon tests to determine mean and standard deviations. Variable changes are seen in Table 4. Macronutrient distributions fluctuated slightly from pre and post-intervention. Protein consisted of 15.63% of total calories pre-intervention and 16.64% post-intervention. Carbohydrates pre-intervention consisted of 53.5% of total calories and 57.49% post intervention. Fat consisted of 31.86% of total calories pre-intervention and 29.55% post intervention. Trans-fat changed from 0.4% of total calories pre-intervention to 0.1% post intervention.

Table 4. 24-Hour Recall Results Pre-and Post-Intervention (in't) for 16 Latino children that Participated in a 10-week Weight Management Intervention:

Variable	Pre in't Mean N=16	Standard Deviation	% Total kcals	Post in't Mean N=11	Standard Deviation	% Total Kcals
Calories (Kcals)	1604	632	N/A	1525	552	N/A
Protein (g)	62.7	23.7	15.6	55.8	23.60	15.6
Carbohydrates (g)	214.50	99.29	53.5	219.2	81.6	57.5
Fat (g)	56.8	27.4	31.9	50.1	26.5	29.5
Cholesterol (g)	252.0	156.2	N/A	173.9	130.1	N/A
Saturated fat (g)	18.8	7.41	10.6	16.6	8.9	9.8
Sodium (mg)	2165	910	N/A	2273	949	N/A
Trans-Fat (g)	0.7	0.5	0.4	0.2	0.3	0.1
Dietary Fiber (g)	14.1	5.7	N/A	16.6	7.8	N/A
Soluble Fiber (g)	0.5	0.6	N/A	0.4	0.4	N/A
Sugar (g)	84.8	52.1	21.2	94.9	46.1	24.9

Pre-intervention dietary recalls showed that children had an average intake of 1,604 calories per day. Macronutrients were reported for protein at 62.7 grams per day (15.6% total kcals), carbohydrates at 214.50 grams per day (53.5% total kcals) and fat at 56.8 gram per day (31.9% total kcals). Saturated fat was reported at 18.8 grams per day, 10.6% of total daily calories. Dietary fiber was reported at 14.1 grams per day and trans-fat was seen at 0.7 grams per day with a 0.4% of total daily kcals. Post-intervention

children were reported to have eaten an average of 1,525 total calories. Macronutrients from dietary recalls showed protein consumption at 55.8 grams per day (15.6% total kcals), carbohydrates at 81.6 grams per day (57.5% total kcals) and fat at 26.5 grams per day (29.5% total kcals). Dietary recalls showed saturated fat intake at 16.6 grams per day, 9.8% of total daily calories. Dietary fiber changed to 16.6 grams per day and trans-fat was reported at 0.2 grams per day with a 0.1% of total daily kcals.

Based on the 24-Hour Recall children consumed an average of 214.50 grams of carbohydrate (53% total kcals) and 219.2 grams per day of carbohydrate post-intervention (57.5% total kcals) both within recommended percent levels. Total fat level pre-intervention was reported at 56.8 grams (31.9% total kcals) and 50.1 grams post-intervention (29.5% total kcals). Both saturated and trans-fat fat levels were within recommendations. Saturated fat levels pre-intervention was 10.6% and 9.8% post-intervention. Saturated fat levels pre-intervention was higher than recommended but fell into the recommended levels post intervention. Trans-fats were 0.4% pre-intervention and 0.1% total kcals post-intervention. Trans-fats were within healthy dietary guidelines both pre and post-intervention.

During the 24-hour recall many children seemed to forget what they had eaten the day before and pointed to food models and claimed that's what they had eaten. In one instance a young boy picked up a serving of pineapple. When asked what he had eaten the day before and said, "I ate this," while his sister who was sitting nearby proceeded to say, "no you didn't." When this child seemed uncertain with their diet the day before a

parent or guardian was asked to help the child clarify what they had eaten away from home. Since children were more involved in the data collection of the 24-hour recall compared to the Block FFQ, exclusively filled out by parents with regards to their children's dietary habits, there may be less accuracy in the data since the children seemed forgetful and had difficulty remembering what they had eaten the day before.

For children less than the age of 12, proxy reporters for participants should be involved for Block FFQ and 24-hour recalls since significant errors in food recalls and portion sizes have been reported. Energy intake validation studies have led to the prevalent recognition that dietary intake data on children is prone to under-reporting error (Livingstone et al., 2004). In the 10-week weight management intervention child proxy reporters were encouraged both pre and post-intervention, but was not required if the child seemed to remember what they had consumed.

Comparing the methods, it can be seen that the 24-hour recall produced consistently higher results in caloric intake than the Block FFQ. When examining calories, the 24-hour recall had higher kcal intake results overall but decreased from an average of 1,604 kcals pre-intervention to 1,525 kcals post intervention. The Block FFQ showed an average of 1,031 kcals pre-intervention and decreased to 1,000 kcals post-intervention. Carbohydrate, sugar and fiber results were similar where 24-hour recall data was higher both pre-and post-intervention compared to the Block FFQ data pre-and post-intervention. Findings from this study regarding the Block FFQ and 24-hour recall

refute current literature since most other studies have found that Block FFQ tend to have higher caloric intake data than the 24-hour recall when also comparing both methods.

No significant difference was found between total energy, fat, protein and saturated fat between kid's Block FFQ when compared to 24-hour recalls. Some differences for carbohydrates and micronutrients have been found. No significant change was found in carbohydrates for both methods of dietary intake based on the Smith and Fila research or the 10-week weight management intervention (Smith & Fila, 2006). The 10-week weight management intervention found that there was a large difference for total energy recorded intake, which was not found by Smith and Fila (2006).

Parent Demographics and Cultural Background.

To further understand this population, it is important to explore the cultural background of the participants. Many different Latino people have immigrated to the United States in recent years bringing with them diverse cuisines, food culture and traditions. Parents and families that participated in the 10-week weight management intervention were predominately from Central America while one participant parent was from Mexico. Most parents stated they were from these Latin countries: El Salvador, Honduras, and Guatemala. El Salvador, the fifth largest immigrant population in the United States and has increased to more than 1.6 million people since 2010. After the 1980's there were increases in immigration because of civil wars. Similarly, since 1990 many Hondurans have immigrated to the United States because of natural disasters and civil wars. Guatemalans are also a large Central American immigrant population, second

largest to El Salvador. Mexicans account for 28% of immigration in the United States and have varying food traditions of their own (Zong & Batalova, 2016).

Food staples for these four countries are similar in many ways. Corn is the main staple food for El Salvador, but also has a heavy focus on rice, bread, red-black and white beans, beef, pork, poultry, dairy and papusas (a traditional fried bread). In El Salvador women are the main chefs in the home, as is with Hondurans. Many staple foods for Honduran people include: beans, rice, corn, plantains, chicken, pork and fish. Honduran food tends to be mild in flavor and consist of many different soups. Guatemalan food ways are part of Mayan civilization and also consist of maize, beans, tortillas and tamales. Indigenous and Spanish colonial food ways tend to dominate cooking styles. Budget and time constraints seem to be the largest factors for Latin American people where food traditions resemble the U.S working class, where many traditional recipes are only prepared around the holidays. Primary foods for Mexicans include: corn, beans, rice and chilies. Women are the primary cooks but where meat is incorporated men tend to take the lead in the kitchen. Traditional Mexican foods is easier to access than the other countries traditional foods since Mexican food is popular in the U.S. Many grocery stores stock and sell Mexican food products (Eff, Knepp, Stanford & Morales, 2015).

Parent Exit Survey

All participants (100%) enjoyed the location of the intervention and felt the lessons were educational and helpful. The ten-week program was the right amount of time for these individuals although 36.4% would have liked a medical doctor to give a lecture. All, 100% of the participants enjoyed each lecturer and felt they did an excellent

job. Helpful feedback based on the survey, included the desire for more professionals to give a lecture, such as a licensed psychologist. Post intervention 80.8% of the participants felt that they could make better health decisions while only 18.2% felt slightly more confident in making healthy decisions for their child. All participants reported that they felt respected and received enough group support.

Based on the exit survey it became clear that there is room for improvement for the intervention, survey seen in Appendix C. Although 90.9% of participants felt the intervention was worth their time, 9.1% felt that it was not. Participants would have liked their children to be more involved with the nutrition and behavioral health education for future studies. Parents felt that their child would have gained more if they learned about nutrition from the health care professional versus having the parents deliver the messages to their children at home after the lesson.

Intervention participants stated that they saw behavioral change in their children post intervention. Parents said that children now choose healthier foods more often, ate fewer unhealthy foods, were more physically active, drank more water and ate more appropriate portion sizes for meals. These answers correlate to what was mentioned during later interviews. During interviews mothers often mentioned that their child now ate healthier foods not only because they increased access to nutritious food in their home, but also because the child was more aware of unhealthy foods and wanted the healthier choice. What was highlighted in the exit survey corresponded to what mothers stated during interviews.

All participants mentioned that they felt the lessons were educational and helpful, but some parents felt the length of the program should change. Where 81.8% felt the 10-week intervention was sufficient but 18.2% felts the program should either be 6 months or a year in length. All families enjoyed having other families participate and liked the group atmosphere. Participants said that they received enough nutrition and physical activity education to make better health choices for their child. Parents mentioned many aspects of the study that were beneficial to them including: how to include fiber in their diets, how to change their lifestyle at any age, how to eat healthy (include more fruit and vegetables in their diets), how to eat correct portion sizes and how to increase exercise. All participants expressed that they would participate in the program if offered again where 81.8% stated they felt more confident when making healthy food and active choices for their children.

Exit surveys indicated that parents saw many positive changes in their child's health behaviors, where 63.6% of parents said their child now chose healthier foods more often, 36.4% mentioned their child ate fewer unhealthy food and 45.5% saw an increase in water consumption with their child. Even though these children were above the 85th percentile for BMI, which categorized them as obese or overweight, parents still had varying belief about their children's weight. Most parents did say that their child was overweight but 36.4% said their child was normal weight. Most parents also rated their child's health as a good at 45.5% and 27.3% at fair and 27.3% at excellent. Even though children were above the 85th percentile for BMI, which increases risk for disease, most

parents reported that their children had low (36.4%) or normal (36.4%) probability for disease. Only one parent stated that their child had high risk of disease.

Parents were also asked to rate their own weight, health and risk for disease. The reports parents gave about their own health seemed more accurate than the reports for their children. Parents rated their children at lower risk and better health than what was found based on CDC growth charts and BMI. Parents mentioned most often that they were overweight (36.4%) or obese (27.3%). Parents commonly rated their health as good (45.5%) even though they stated that they were overweight and obese. Lastly, parents rated their own risk for disease as low (18.2%), normal (36.4%) and high (9.1%). One parent rated their risk at very high and two parents stated they did not know their risk.

Program Outcome Beliefs.

Participants had many things to say in regard to what they liked and what they would improve about the program. All participants were appreciative of the respect from staff and were grateful for the information that they learned. Many mothers mentioned that they would like to have their children involved in the nutrition lessons in future studies. Parents said they had a hard time conveying nutrition information and stated that they tried to tell their kids what they had learned but felt it would be more beneficial if they participated in the lessons. Mothers also mentioned that for future interventions it would be helpful to review traditional recipes and have nutrition staff make suggestions about how to improve the health quality of the meal. Some mothers felt that nothing needed to be changed to improve the program while others wanted the length of the

program to increase. Participants said that the program was very redundant but worth it. Overall most participants felt that the intervention was helpful and worth their time.

Based on what parents felt about the 10-week intervention program it can be said that future interventions that target obese Latino children in family interventions should include parents and children in education sessions. Since participants liked the program and were comfortable with the staff it was easier for parents to participate in the lessons. Overall, the length of the program seemed to be suitable for most. Participants enjoyed the program and said they would participate again if offered another time. This program positively impacted Latino families and encouraged them to change their health behaviors.

Parent Demographics.

Parents that participated in the study shared very similar demographics as seen in Table 5. The average family home had 3.3 members (including adults and children). Most participants, 62.5% reported that they did not have enough to eat on a monthly basis. Many of the participants (25%) had a familial income less than \$15,000 annually, but there was a fairly wide income range. Based on the demographic information it can be seen that most families make below the federal poverty line. The current federal poverty line for a family of four is \$24,600 (Federal Poverty Guidelines, 2014). Having a low familial income decreases food security in the home since there is a lack of sufficient income. Some families had more than 2 children and extended family members living in the home, which also decreases access to enough financial resources for all family members.

Most parents were not fluent in English and were recent immigrants from Central America or Mexico. Lacking English fluency in the United States has challenges for job attainment and assimilation. Lacking English fluency while residing in the United States also makes it more difficult for individuals to access the appropriate health care (Escarce & Kapur, 2006). Primarily speaking a language other than English also makes it harder for families to adjust and assimilate to the United States.

Participants originated from many countries mainly that of Central America including El Salvador, Honduras, Guatemala and Mexico. The majority of participant parents were from El Salvador, 62.5% of mothers (N=10) and 58.3% of fathers (N=7). Most parents reported working lower income jobs including: construction worker, plumber, painter, cook, assistant, McDonalds' worker, secretary and mechanic. While one individual reported being a lawyer. Having lower paying jobs makes more challenges for families around getting sufficient food and other necessitates.

Highest education attained on the maternal side consisted of (20%) elementary and (53.3%) high school education. Similarly, paternal education consisted of (27.3%) elementary and (27.3%) high school. A lack of higher education also decreases the probability of earning higher paying jobs. As previously discussed amount of education and degree of obesity is correlated, where individuals with higher amounts of education are less likely to be obese and also have more access to health care (Devaux et al., 2011). Since this population mainly graduated from high school and few went to college this

population is more likely to live sedentary lives and have higher risks for disease (Cutler & Lleras-Muney, 2006).

Table 5. Demographic Information for Latino Participants of the 10-week Weight Management Intervention Spring 2017:

Variable	
<i>Average age of Mothers</i> N = 16	Maternal Age= 37.63
<i>Average age of Fathers</i> N= 16	Paternal Age= 40.93
<i>Average household</i> N= 16	Adults = 3.58 Children = 3.11 Total = 3.30
<i>Country of Origin- Mothers</i> N=16	El Salvador = 10 (62.5%) Honduras = 3 (18.75%) Guatemala = 2 (12.5%) Mexico = 1 (6.25%)
<i>Country of Origin- Fathers</i> N=12	El Salvador = 7 (58.3%) Honduras = 3 (25%) Guatemala = 2 (16.7%) Mexico = 0 (0%)
<i>Annual Income</i> N=16	<\$15,000 = 4 (25%) 15,000-29,000 = 2 (12.5%) 30,000- 44,999 = 3 (18.75%) 45,000 – 59,999 = 3 (18.75%) Refused to Answer = 4 (25%)
<i>Maternal Education</i> N=15	Elementary School = 3 (20%) High School = 8 (53.3%) Apprenticeship/vocational = 0(0%) College = 3 (20%) University = 1 (6.7%) Refused to Answer = 0 (0%)
<i>Paternal Education</i> N=11	Elementary School = 3 (27.3%) High School = 3 (27.3%) Apprenticeship/vocational = 1 (9.1%) College = 1 (9.1%) University = 1 (9.1%) Refused to Answer = 2 (18.2%)

<i>Enough to Eat on a Monthly Basis</i> N= 16	Yes = 10 (62.5%) No = 5 (31.3%) Refuse to Answer= 1 (6.3%)
<i>Single Family vs. Two-Parent Household</i> N=4 N=12	Single Family = (25%) Two-Parent Household = (75%)
<i>Families Receiving Women, Infants and Children (WIC)</i>	N= 3 (9.7%)
<i>Families Receiving Supplemental Nutrition Assistance Program (SNAP)</i>	N= 2 (6.5%)
<i>Families Receiving Free and Reduced Lunch</i>	N= 12 (38.7%)

Interviews

Interviews help to gain better understanding of a topic in question and clarify why a population has certain food behaviors based on values, attitudes and intentions. One study focusing on interviews with obese Latino adults that had type 2 diabetes found that this population needed self-management goals for greater success (Early, Shultz, & Corbett, 2009). Researchers found that dietary meal plans were affected by self-efficacy, perceived barriers and social/familial support. They conducted one-on-one interviews and uncovered many aspects of dietary habits to fully understand barriers and obstacles that may conflict with healthy habits. Participant goals were tracked via anecdotes (Early et al., 2009). During this 10-week weight management intervention it was found that interviews gave researchers a broader perspective into these Latinos lives and how to increase their healthy lifestyle changes.

Throughout this thesis it became evident that gender, family and self-efficacy primarily informed participant food and health beliefs, attitudes, norms, behavioral

intentions, and behaviors. Interviews showed deeper insight into gender roles and how traditional expectations of males and females in the home influenced dietary behaviors and habits. Gender was an important factor that arose throughout the conversations, where the women took responsibility for many aspects of the family's life.

Participating mothers consistently mentioned their gender role in the family as the mother, homemaker and caretaker. Their gender roles influenced how their children were raised, who was responsible for which tasks and who was in control of family decisions around the home, food and health behaviors. Interviewees also discussed their family in detail and how the people around them could be an instrument for success or a barrier to accomplishments. Family values and familial support were a strong influence of health habits. Family traditions and assimilation also played a role with how dynamics in the home were set up. Self-efficacy and health behaviors dictated how many other aspects of the mother's lives were structured. Portion control, family members as barriers, fear of negative health consequences, time, and money were areas of focus for mothers. Rewards to health behaviors, convenience and external factors that inhibited self-efficacy were also areas of discussion.

The mothers' locus of control encompassed almost every few sentences spoken. Many factors were intertwined with the mother's ability to feel that she was capable of accomplishing tasks. The mother's ability to feel in control of her family's health included her feelings around money, time, family support and influence. Lastly, data uncovered deep seeded emotions around family importance, influence and how family

values change health behaviors for Latino families. Family was very important to each mother and also was a great source of support, encouragement and could also be a barrier to success.

Gender Roles

The literature suggests that Latino families tend to have specific ways and traditional gender roles for the husband and wife (Vega, 1990; de Rios, 2001). Based on these interviews it seems that mothers and fathers tend to follow these cultural norms, where the man is the authoritarian and the provider where the woman is the caretaker and homemaker. These traditional roles affected how they spoke about the home, their children and family.

Interviews showed deeper insight compared to parent exit surveys into gender roles and how traditional expectations of males and females in the home influenced dietary behaviors and habits. Gender was an important factor that arose throughout the conversations, where the women took responsibility for many aspects of the family's life.

Gender and behavioral roles are deeply ingrained in every culture regarding what is appropriate and what should be done with the home, money and family raising (Galanti, 2003). With these nine female participants, gender was a commonality. Each woman talked about her role in the home as the family caretaker, food provider and planner. Each mother mentioned that she planned meals, grocery shopped, and bought the food for her family. Most mothers mentioned that their husbands rarely cooked but would sometimes help shop for the food or would pay for it. When asked why the

women were the ones in charge of the food one woman responded, “as the mother we are aware of everything,” which was indicative of similar comments received from multiple women in the study.

There are many cultural differences for families immigrating from varying Spanish speaking counties (Skogrand & Singh, 2005). Gender roles in Latino culture can be explained by the concepts of *machismo* and *marianismo*. Machismo dictates many aspects of Latino male behaviors and actions. Machismo can be seen as the expected male characteristic that he will show strength and power. In Spanish, macho means man and in current culture can symbolize a strong man that ignores pain (Ulloa et. al, 2017). Marianismo, the female version of machismo, is the gender characteristic that women or the mother of the family should be the “ultimate source of nurturance and moral authority in the family” (Landale et. al, 2006).

Since traditional gender roles in Latino culture tend to be strongly set they can greatly affect marriage and family dynamics. The man is expected to be strong, brave and the authority figure of the family, which then subsequently sets the roles for the other members of the family. Since the man is seen as the protector and the provider for his family (de Rios, 2001; Falicov, 1998; McGoldrick et al., 1991; Vega, 1990) the female role is then set as the mother, housewife and care taker. The woman is seen as self-sacrificing, religious, and responsible for the home and the children (Bean, Perry, & Bedell, 2001; Falicov, 1998; Penn, Hernandez, & Bermudez, 1997; Vega, 1990). Motherhood is seen as one of the most important goals for Latina woman. As a mother she is expected to sacrifice for her children and take care of other family members

(Gracia-Preto, 1998). Assimilation to the United States and the need for mothers to be employed have affected these traditional roles, but these roles are still prevalent in low-income families (Vega, 1990). Research has found that in Latino marriages both males and females of the family shared decision-making in the family but had different responsibilities for everyday family life. Skogrand (2004) study participants conformed to traditional gender roles where the men provided financially for the family and the woman took care of the children and their home (Skogrand, et al., 2004).

Gender Roles and Children.

Children are typically the center of the family and help to “energize and restore the human spirit” during family gatherings (Latino Family and Culture, 2018). Family is seen as a source of joy, support and helps to form individual identities (Hofstede, 1980). Family is often seen as an individual’s ‘entire world,’ and a great support system. Latino family members provide social, emotional and financial support and encourage close family relationships. Families put an emphasis on cooperation and interdependence where individuals are expected to sacrifice their own needs for the good of the overall family (Falicov 1998; Santiago-Rivera, Arredondo, and Gallardo-Cooper 2002; Skogrand, Hatch, and Singh 2008). Interview participants mentioned how important their children were to them and explained many times how the needs and wants of the youth influenced family dynamics and decisions. “My son is the one who needs me the most at this time...I do everything for him.” Another mother said, “I look for a way to please them” referring to her husband and daughter around food and meals.

When the participating mothers talked about teaching their children about what was healthy and how to cook, many mothers mainly mentioned that they were teaching their daughters how to cook. They rarely mentioned their sons specifically. Only one mother particularly mentioned that she encouraged her son to enter the kitchen with her when she cooked since she intended for him to learn about what she was doing. "...I cook what I have to cook for everyone and make him (my son) participate in what I'm doing. I say: come help me do this. It's something to motivate him... there seeing how things are done." Another mother said, "I feel a lot of kids that they need help you know, especially boys." Some mothers felt that young boys needed more help than young girls.

All other mothers either said that they prepared the food alone or had help from their daughters. Interviewees also mentioned that their husbands did not cook and when they did cook it wasn't often. "If my husband wants to eat something or if he has time to go to the store he will buy to do it instantly. It's rare that he cooks..."

Paternal involvement in child rearing is correlated to better child outcomes and functionality of families. "For Latino fathers in the United States, paternal involvement may vary on the basis of cultural and gender norms, acculturation process." Paternal involvement is connected to machismo, and the degree of acculturation. Latino father's acculturation and macho attitudes were correlating to paternal involvement (Glass & Owen, 2010). All participating interviewees reported to be primarily responsible for the children, food and home, where the men were often the bread winners for the family.

Gender Roles and Responsibility.

When it came to gender, themes of control and responsibility consistently arose. Most women felt that as a female their role in the home as the “housewife, the mother and the woman” was established and was their duty to take care of the family. They seemed to feel responsible for the health of the family when it came to food. The women did not mention their responsibility in a way that it was a burden or a role that was put onto them but instead was mentioned as a way of life and a matter of fact.

Table 6. Post 10-Week Weight Management Intervention Interview - Gender Roles and Responsibilities Quotes:

Participant ID #	Interview Participant Quote:
005	<p>“I do, I cook, I buy...I do everything. I decide, and I ask them what they would like to eat, and I decided when it is prepared.”</p> <p>“Because I am in the one that is in the house and my children and my husband. But my husband is working all the time.”</p>
008	<p>“I cook, and I also go out to buy the food.”</p> <p>“Yes, my husband... when he comes home from work, he says: I want to eat, I am hungry. Then I go and the three of us eat together.”</p> <p>“As the mother who is aware of everything... of food, of cooking.”</p>
011	<p>“I go shopping and all three we cook.”</p>
012	<p>“Cooking and shopping I always do it. Me, I do everything.”</p>
016	<p>“I cook, I go shopping...that helps me to keep a little control of how healthy my husband and my father eat.”</p> <p>“Because I am the only one in charge, the mother, the housewife, and the daughter. So, I’m the only one who watches over their food at dinner...”</p>

In many Latino families, the mother is seen as the moral and practical compass as well as the source of values. Machismo and marianismo are cultural ideals and are not

expectations to be lived by day to day. These ideologies have been seen perpetuating inequalities of social roles between males and females. The patriarchal Latino man is expected to front a strong presence for the benefit of his family and fill the role of the protector, which in turn results as the ability to exercise control over his family members (Hispanic-American Families - Latino Family Roles, 2018).

It seemed that responsibility to take care of the family and all aspects around food was engrained into the women's actions around female gender roles and what needed to be done. For many cultures women are in control of the meals and food preparation especially in Latin cultures, where mothers took accountability for what they needed to get done. Many women that were interviewed mentioned that they planned their meals around what the family wanted and sometimes had help shopping from their spouses. It seemed that the women felt an ingrained responsibility to take care of the home, children, food and their husbands. Many of the women mentioned that their husbands were the ones to work and earn a living for the family, therefore, leaving her at home. Some participants mentioned that their husbands would buy the food but rarely cooked or prepared meals. Women did not seem to be upset by their gender role in the home, but sounded more as if they accepted their responsibility to take care of their home, food and family.

Gender Roles and Control.

When talking about the home and the role that each mother played it seemed that mothers accepted their place in the family and understood that this was their role in the

family. But, when it came to control many mothers seemed to feel less in charge of how things were decided. Most mothers said that they felt they had control over her child's health based on the food that she provided them in the home but did not have control when the child left the home. For example, when mothers sent their children to school some mothers mentioned that their kids ate school lunch, but felt it was unhealthy and their children also mentioned that it did not make them feel well.

Mothers also had difficulty controlling food outside of her home. One mother felt she had control over what her child ate when she was around and often packed him lunch, but she did not know what he would eat out of her sight. "Since I'm going to work... There is no one that supervises him." Most women felt that they could provide nutritious food in the home, but lost control when it came to outside environments and differing opinions with family members around health. For example, there were many times that mothers mentioned their intentions around food and how they wanted things to be done a certain way but once her children left the house they were then exposed to new foods and would then consume less healthy options.

Table 7. Post 10-Week Weight Management Intervention Interview- Gender Roles and Control Quotes:

Participant ID #	Interview Participant Quote:
004	“...Because sometimes he does not want the food...there was a day that he told me that I only cooked him healthy food.” “Because of what I feed him you know, if I feed him healthy meals he is going to be healthier and he is not going to gain more weight.”
012	“But in the control of the child I do not know what is happening, that is the concern that I have.” “...When I am not around...they drink the soda...I choose not to buy it, but my daughter does.”
016	“...But sometimes I force him to eat our food...something healthy out of what he wants.”

“When I go to work, in the afternoon he begins to eat chips, this, and that,” or
“I tell him: you are going to eat this when you come from school. This you are going to eat later and then I do not want to see you eating anything else. And since I'm going to work there is no one that supervises him.”

Mothers felt the responsibility to give her children healthy food but felt a lack of control when they were not around. “But what he doesn’t eat at home, he eats with her sister on the street or at school...that I can’t control it.” Mothers intended to control their children’s diets to make sure that they were eating healthy foods, but when their children were out of their sight or not in the home mothers could not control what they ate.

Control over poor nutrition behavior was difficult for mothers. They mentioned that their children and family members would get angry when they tried to reduce less healthy foods, but it was necessary. “So, they don’t exceed all those things... because if not, all diseases come.” Many times, mothers mentioned that they tried to get their

families to eat healthier food, but their husbands or children became upset, making it a struggle for her to do what is best health wise. Control over food was not a simple task for mothers, even though she was responsible for provision and cooking in her home. Her husband's power in the role intersected with her role in the home and made it more difficult to do the best job she could.

Gender roles in the home may also alter how successful the mother can be when providing healthy and appropriate meals for her family. Male and female relationships may branch from traditional gender roles where the patriarch is seen as the authority figure and the matriarch is expected to fill the role of the housewife and mother (Daniel-Ulloa, Sun, & Rhodes, 2017). Many Latino men and women agree that the best choice for a family is for the father to work outside of the home while the mother takes care of their children (Halpin & Teixeira, 2010; Landale et al., 2006).

Control also became more difficult for mothers when their husbands had differing food preferences, which negatively influenced her and her children's diets and willpower. Some of the women mentioned barriers to their health success including: family support, family influence and husbands as a barrier. In the subsequent sections barriers around family and self-efficacy will be further discussed.

Family

Family Support.

Aside from gender, family was also a major trend in the interviews. Family support strongly influenced mothers' capabilities to successfully provide healthy food for

her family. One mother spoke about how she continually made healthy food for her children, but her older daughter would take her son out to eat fast food instead. This mother continually stated that she felt she lacked support, which made her feel like she was not capable of changing food habits and lacked control. This mother intended to change her son's eating behaviors since he was at risk for health complications based on his BMI above the 85th percentile. Many times, she spoke about how she would ask her son if he was hungry and he would say no, but then proceed to go to his sister when she arrived home and ask her to take him to eat fast food. This mother had the self-efficacy and capability to change eating behaviors but lacked the help and support of her daughter, which then negatively influenced her son. If this mother had more support around eating healthy foods from her daughter, she would be less concerned and worried about her son's health and eating habits. Mothers not only mentioned that they lacked support from their children around eating healthy but also did not have enough support from their husbands, "I think that more support from my husband (would help me eat healthier)." Family support does not solely include the immediate members but extends where the encouragement from all parts of the family influences behaviors.

The importance of extended family- *familialism* is a unique aspect of Latino culture. Familialism provides strong support in the nuclear family where the strong family connections provides and reinforces the ideal that the individual is less important than the family as a whole (Villarruel, 1997). Most Latino families are extremely close with their relatives and often function as a unit where friends are occasionally seen as family. There tends to be a hierarchy in Latin American families where the oldest male

has the most control and power. Future research should incorporate and consider the importance of extended family to the Latin culture. Often times Latin families are seen as a unit and all members of the family should all be taken into account when developing and implementing family programming (Olsen & Skogrand, 2009).

Family support for each mother played a significant role in her self-efficacy and if she felt that she could provide nutritious meals. Mothers made it clear that when they lacked the appropriate support they felt that they couldn't make healthy food for their family in turn reducing her self-efficacy. "I was trying to do healthier foods at home, but my sister-in-law has just arrived, and we cook together. But she doesn't like things like lettuce."

Mothers were given the tools and knowledge to make better choices with food but lacked encouragement from her family making her health implementations more difficult. Family support is an obstacle that mothers face when trying to provide healthier foods for their family.

Family Values.

Family values also dictate how capable a family is when attempting to change health habits. Strong family values can be seen in Hispanic and Latin American culture, where close-knit families are the norm. Many families may have multiple generations living in the same household or nearby. Families elders and grandparents tend to play a significant role in the children's upbringing. The emphasis on family makes extended family gatherings commonplace (Halpin & Teixeira, 2010).

Family needs tend to override individual needs in Latino families where an individual's worth, security and identity are established by his/her relationship to the family (Ho, 1987). The family concept can also extend to friends, neighbors and those that make up the community. This network is important when the family needs support or when problems arise (Delgado, 1998). The *familialism* concept assists in family survival during difficult times.

Many values surfaced during interviews that also were tied to parental self-efficacy and how mothers felt they could perform when taking care of their families. Some values that were mentioned include that mothers wanted to please all of their family members with regard to food, wives would wait for their husbands to get home from work to eat showing the importance of family time spent together, and that mothers tended to cook with other women showing the importance of female support. When family values around healthy food coincided with what the mother's food and health values were her self-efficacy and capability to provide the best food for her family was improved.

Mothers valued food desires of her family and intentionally made meals that pleased everyone, which influenced her diet. Since mothers valued what her family wanted to eat it also shaped what she ate and provided for the family. Mothers valued family support and seemed to have greater self-efficacy when family members helped each other out. Mothers either mentioned that they did or did not feel supported by their daughters with grocery shopping and preparing meals and when their daughters helped

with shopping she reported feeling more at ease. Family values were tied closely to family influence.

Family Influence.

Mothers relayed that they were strongly influenced by their family's wants and needs. "I ask my daughter what she wants to eat, and we go together to buy. I ask her what she wants, and she tells me what she wants. Then I do it for her." Interviewees stated that they prepared food when the family said they were hungry where most mothers. Mother's food choices were strongly influenced by her spouse's food choices which will be further discussed in the husband as a barrier section. When a husband wanted to eat fast food or brought less healthy choices into the home it changed the family's food access. When an interviewee stated that her husband liked fast food, she sounded like she still wanted to please the family with food preferences even when she knew those options were less healthy. This influenced what foods she ate and what foods she then served her family. Many parents said that their older children were also a negative influence on their younger children around food. Family influence played a strong role in what mothers mentioned that they ate and prepared for their family. It seemed that if other members of the family prioritized healthy living more prevalently it would be less difficult for mothers to try to positively influence change.

Parental Influence.

Mothers continuously mentioned that they believed they influenced their children and were role models for the behaviors of their kids. Mothers understood that, "We as

the parents are the reflection of them. Everything they see that we do, they imitate it... then if you eat healthy they will also eat healthy.” This understanding shows that mothers intend to be positive influences for their children so that they will learn healthy eating behaviors. Mothers were aware that they were a strong influence of their child’s behaviors and actions, “The concern for the nutrition of the children, for us parents also influence us a lot. We are the base of them.”

Parents mentioned that it was important to involve their children in food related activities so that they could realize that they needed to make changes to their own lives for health. Some mothers felt that it was more beneficial for health and nutrition knowledge to come from someone other than them, “Mom teaches them, but it is better that it comes from someone else so that they understand it better.” Many mothers mentioned that they wanted their children to be involved in the lessons. Mothers also understood the importance of encouraging their children to exercise and reduce sedentary time, which changed after the classes.

Family is a strong factor for all of these mothers when making daily choices and should be integrated into any intervention with Latino populations. These mothers discuss their families with many different views, but all mothers stated that they cared about what other family members wanted and aimed to please them. Family influence can be a determining factor when trying to eat a balanced diet. In the case of these interviews, all mothers felt they had a missing piece in one area or another that factored into their lack of self-efficacy.

Traditions and Assimilation to the United States.

Acculturation, “the process of adapting to another culture while attempting to hold onto one’s original culture,” (Olsen & Skogrand, 2009) for Latino families also plays a significant role in family culture and traditions. Many participants mentioned that their diet and way of life had shifted since they moved to the United States while others mentioned that not much had changed since they moved. Many mothers discussed that they now changed the way that they ate and what they bought from the grocery store because their food access changed. Many mothers said that fast food access dramatically increased and initially increased her family’s consumption of junk food as well.

Participants occasionally mentioned their heritage and how it impacted what they ate and how it changed food traditions. Interviewees often expressed the importance of their culture and how their ways of life were deeply imbedded and that they continued to practice cultural traditions so that “the ways of the mother would not be lost.” Understanding one’s heritage and using traditional practices during relationships is crucial for family well-being and can be seen as an essential aspect for interventions to incorporate when attempting to achieve cultural appropriate studies (Olsen & Skogrand, 2009; Skogrand, Hatch, & Singh 2008). Not only did gender roles and family strongly influence health behaviors but self-efficacy also effected intentions and actions of Latina mothers in the intervention.

Self-efficacy and Health Behaviors

Self-efficacy, the personal belief that one can or cannot perform a certain action successfully was significant and overwhelmingly evident in all participants (CHIRr,

2018). During these interviews self-efficacy and behavioral intentions arose as to health and ability of participating mothers to take care of their families. Many mothers mentioned that they intended to eat better and give their children healthier options to decrease the risk of their children developing diseases such as diabetes, which was common among adult participants. This action showed that the mothers had health literacy post-intervention and could determine that they needed to take action and provide healthier options in order for their children to stay healthy and decrease the risk of developing diabetes. Health literacy does not have a consensus definition, but the WHO defines it as the cognitive and social skills that establish the motivation and capability of individuals to “gain access to, understand and use information in ways, which promote and maintain good health” (Nutbeam, 1998). Mothers that discussed diabetes understood that it was hereditary, and diet played a significant role in the chances of developing negative health outcomes. Health and nutrition literacy in the form of self-efficacy was also a common category throughout the interviews.

Of the nine participants five of them mentioned that they were now controlling portion sizes and what foods were available after the intervention. By increasing the healthy food access in each of their homes, many interviewees mentioned that they (the mothers) were now feeling more energetic and saw that some of their children had unintentionally lost weight. Mothers mentioned that they could now determine what was healthy and what was not after the intervention. Many interviewees stated that they now read food labels before picking out food at grocery stores. Mothers mentioned that they now were aware of sodium, sugars, fats and cholesterol compared to prior to the

intervention. Many mothers said that they now controlled what foods were available in the home and intended to decrease access to sugary cereals, SSB, fast food and meat. Almost all mothers mentioned that meat was bad for you and should not be consumed in excess even though the discussion of meat was not significant in the lessons. In Lesson #1 the importance of reducing red meat and increasing lean protein was a focus; however, poor health in correlation with meat was not discussed. The fact that these mothers mentioned meat as a harmful food to health must be culturally learned but is not elaborated on in existing literature.

Portion Control.

After the intervention almost, all mothers mentioned that they were now taking different stances around portion sizes and how much they were eating. “More conscious of portions and I do ... small meals and snacks.” Participants mentioned understanding that overeating was harmful to their bodies and that healthy diets maintained smaller portions. “I’m eating less. I ration what they eat” and “Eating too much harms you.” Mothers intended to eat smaller portion sizes, some also mentioned that their children used to overeat and finish their plates, and now stopped eating when they felt full post intervention. One mother said, her son “is more conscious now, he leaves now food on the plate, which he didn't before. Now he leaves...okay Mama I’m full, I don't want anymore.” This shows that the intervention helped families make more mindful choices around portion control and amount of food consumed, as discussed in Lesson #3.

Mothers also talked about how they were now limiting themselves with traditional foods and excess calories. One mother from El Salvador said that she used to eat four, five, or six papusas (a traditional fried bread) at a time, but after the nutrition lessons she now would eat two or three papusas and stop. She said that her behavior around portion size also changed after she learned how many calories were in a serving. “I try to control myself, I say: I have to stop here.” Mothers also discussed how they were now limiting their children’s juice, SSB and sugary cereal consumption with accordance to the lessons. “I choose not to buy it (soda).” Mothers understood that if they ate too much they would gain weight, which would negatively impact their health. The statements mothers made correlate with Lesson #3, which focused on portion sizes and listening to the body’s natural hungry and satiety cues.

Self-efficacy and Attitudes.

Aside from portion control, mothers also expressed many ideals and beliefs around their ability to complete a task. When a mother said that she had control over her child’s health she also answered that money and time were not aspects that inhibited her from giving her child healthy food. Mothers that had high self-efficacy felt that they could buy and prepare healthy options with her allotted finances and time.

Perceived self-efficacy can influence how people behave and what outcomes a person expects. The more a person believes that a certain behavior will have a desirable health outcome the more likely there will be “increase perceived self-efficacy for that behavioral result in its adoption and adherence” (Maiback, Flora, & Nass, 1991). When a

mother seemed less confident about her control over her child's health from the start her answers throughout the rest of the interview also seemed to lack confidence. Mothers that answered with a 'can't do attitude' or lack of perceived control also mentioned that she lacked self-control, and willpower even though she mentioned that she had the knowledge to make healthy choices for herself and her family around food and exercise.

Perceived self-efficacy is conceptualized as perceived operation capability. This perception focuses on the belief that an individual can do a specific task based on their own ability to motivate themselves over the belief that the task ability is correlated to what an individual has resource wise. Perceived self-efficacy is an essential feature used to access people's efficacy beliefs. "Individuals are not asked to rate the *abilities they possess*, but the strength ... they *can execute* given activities" (Bandura, 2007, p. 646). This matches what mothers said throughout the interviews. Some participants felt that what resources they had were enough to keep their family in good health while other mothers lacked the self-efficacy to believe that they were capable no matter their circumstance.

Husband as a Barrier.

Aside from perceived self-efficacy family members also proved to be a barrier to health success. Many of the mothers that spoke in the interviews mentioned that their husbands liked junk food and would negatively influence her and their children. One mother discussed how she intended to decrease her children's SSB consumption, but her husband would continually buy large quantities of Gatorade and other sugary drinks to

have in the home. She confronted him and said, “let’s only buy these drinks the day that we want them,” intending to decrease daily basis access. Her husband got angry and proved to be a health barrier. Even though this mother took her learned knowledge from the intervention regarding SSB and junk food, her husband became a road block for her to decrease less healthy food in their home.

Table 8. Post 10-Week Weight Management Intervention Interview- Husband as a Barrier Quotes:

Participant ID #	Interview Participant Quote:
018	“I tell him it is better that you go to 7-eleven when you need to buy rather than them to drink a bottle of Gatorade...Because there is no control...sometimes he gets mad, but it is the only way.”
016	“My husband because he is the one who throws off my diets...I would like to eat more salad, I would like to eat more fruit...add more of that to dinnertime...but sometimes it is impossible because he is like more traditional, but he eats from our country...it is quite loaded with things.”

Having the same food and nutrition values with familial members is extremely important to attain goals. If an individual’s spouse improves their own behavior, the other spouse is also likely to change their habits (Falba et al., 2007). This finding can also be connected to negative health behaviors, where spouses can mimic poor health habits. Spousal communication and dedication to support correlates to healthy dietary adherence (Beverly et al., 2006).

With this family in particular it became less feasible for her to reach her goal of taking better care of her family. Her husband disagreed, which then turned into a power struggle, where the end goal of better family health was overlooked. Many other

interviewees mentioned their husbands and children as barriers to their success around eating and preparing healthy food. Another mother mentioned that her husband loves junk food and makes it difficult for her to eat healthier food since he is resistant to eating fruits and vegetables.

“He doesn’t eat much salads... and even though I talk to him... you can’t make him eat it. Although I try to do everything that he wants to eat, but low in fat and I try to make it healthier...it does affect us because I would like to eat more fruits and vegetables and the same for the children ... but sometimes I force him to eat our food...something healthy out of what he wants.”

This mother makes it clear that she intends to improve their family’s diet, but her husband is stubborn and gets in the way of positive change. Even though this mother wants to eat a certain way or feels she is capable, her husband disagrees with her intentions to keep her family healthy. Health habits prior to marriage correlate with partner’s health behaviors over time, both for positive and negative habits. Targeting couple’s health may be more beneficial than focusing on individual health for future interventions (Homish et al., 2008). Even though mothers wanted to change their own health habits and those of their children it became difficult when their spouse’s health behaviors were set.

Traditional gender roles shaped the way mothers were able to take care of their family. Mothers had difficulty exerting authority over their husbands when it came to providing healthy foods for their family. Traditional power roles of the male and female made it more difficult for the mother to make better health decisions when her husband

had conflicting ideals. The connection between power roles and decision making around health and food can be connected to Latino cultural gender role traditions.

Mothers mentioned conflicting power struggles over what food was provided for the family. After the intervention most mothers felt they had the ability to make smarter health decisions, but their husband's desire for junk food challenged her choices.

Contradictory cravings for unhealthy food in the family challenged the women in their traditional homemaker roles to make the best decisions for their family's health.

Fear of Health Consequences.

Health behaviors and behavioral intentions also appeared when participants stated their fears of negative health consequences. Interviewees mentioned their fears about becoming sick in many ways throughout each interview. One participant mentioned that, "With time as days go by, more diseases appear... if one does not try to eat healthy." This participant showed that they understand that what they are consuming has a direct impact on their well-being. Participants mentioned, "If I don't eat healthy I get sick... my family gets sick...If I eat bad, logically that I'm going to get sick. If I eat healthy I will have a better and healthier life." Many participants showed that they took the information from the lessons and were able to apply their learned knowledge to their beliefs. One mother stated, "I believe that their risks for disease would be diet and not exercising, you know? More like sedentary life, like watching too much TV, which all of that has changed now." This mother mentions that her fears around becoming sick from not taking care of her health changed her behaviors and beliefs. It is unclear how

participants viewed health consequences before the intervention since interviews were only conducted post-intervention.

Mothers were also clear that they knew that in order to be healthier and live longer they needed to take action around living a more balanced lifestyle. One mother said, “I have to be well for them (my family).” When mothers understood that if they did not try to live a balanced lifestyle by eating well and staying active they would not be healthy in the long run. “I want to eat healthy because of my condition (type 2 diabetes) and I want to eat healthy, so I can be there for my children and so not to be taking so many medications you know?”

Parents seemed to want to take better care of their health more for their children than for their own well-being. Many interviewees had type-2 diabetes and mentioned that they were now more mindful of their diets so that their children would not face the same fate. “I don’t want for them to be suffering the same disease, you know the same problem that I have and to be pricking their fingers every day.” Since the intervention, this mother’s change in behavioral intentions was shown when she said that after taking the classes she provided healthier foods for her family. This participant now increased nutritious food access in her home for her family, “I buy a lot of vegetables...fruits...so they have (that) instead of chips, soda, juices.” The intervention positively influenced what foods she was now buying and increased her self-awareness so that her children would not also develop diabetes.

Table 9. Post 10-Week Weight Management Intervention Interview- Fear of Health Consequences Quotes:

Participant ID #	Interview Participant Quote:
004	“By not eating healthy, this...brings us diseases, obesity.”
005	“Because if I don’t eat healthy I get sick...my family gets sick.”
006	“They are prone to diabetes, both of them (my children) ...So now I think in the future...So I don’t want them to be suffering the same disease, you know the same problem that I have to be pricking their finger every day.”

The interviews showed that the lessons affected their beliefs, attitudes, and intentions whether they felt they could or could not take part in a particular action. Fear of health consequences seemed to be one of the biggest motivators for mothers to improve their diets and what they served for their family.

Reward to Balanced Lifestyle.

Participants were conscious that a poor diet could result in diseases and were also aware that consuming a nutritious diet would in turn have positive health outcomes. Mothers stated that when you eat healthy you have more energy, which helps maintain a healthy weight and reduces risk of illnesses. Interviewees mentioned that when they ate nutritious foods it made them feel better and increased the longevity of their life. “It makes me feel good and I feel that this lengthens our life a little...quality of life.” Mothers understood that by taking care of their health there would be positive rewards for their actions. “If I eat healthy I will have a better and healthier life.”

Nutrition and Health Literacy.

Participants recognized the importance of a person’s motivation and ability to obtain, comprehend and apply information to make knowledgeable health decisions.

“I’m not working on eating a healthy diet, the consequences come.” Health literacy implies an individual’s ability to understand health information and have the ability to apply the information when making health decisions (U.S. Department of Health and Human Services, 2018). Health literacy effects the ability to communicate effectively, knowledge of health and nutrition topics, and culture, which includes language and norms (CHIRr, 2018). The level of health literacy effects a person’s capability to navigate the healthcare system, which includes filling out forms, finding healthcare providers, sharing correct information, engage in self-care and understanding risk of contracting disease. Health literacy also includes numeracy skills, which are included when engaging in disease management, which may include “calculating cholesterol and blood sugar levels, measuring medications and understanding nutrition labels” (CHIRr, 2018). Individuals that have lower levels of health literacy may be misinformed around human biology and the causes of disease. With a lack of health knowledge more complex health issues become difficult to understand including the correlation between diet, exercise and health outcomes (CHIRr, 2018).

Participants mentioned that after the nutrition lessons they were more aware of what foods and actions were harmful to their health. Participants all mentioned that foods such as fruits, vegetables, low-sodium, low-fat, low-sugar and less fried foods were the healthiest options. Mothers were able to apply this information to their child’s health and draw conclusions about necessary changes. One mother brought up the fact that her son’s school lunch was not healthy, which her son agreed and wanted more fruit. She continued to mention that the food was making him sick, “But the issue is the

stomach...he is sometimes constipated and then he blames the food.” This mother was aware that eating more fruits and vegetables would help her son with his constipation.

Mothers also said that since the lessons they read food labels, “Now if we rely in looking at the sodium, sugar in things, salt and all those elements that before the study I did not pay attention. Now it changed and to make it clearer let me tell you that (my son) lost eight pounds.”

Her son who was a participant in the intervention lost weight after his mother changed how they were eating. Mothers understood that being overweight increased disease risk and made you feel lethargic.

The intervention changed how mothers were interacting with food and how they chose products from grocery stores. One mother commented that,

“I have changed my kitchen system obviously. I don’t use cooking oil in my house. There are no fried foods, no fried chicken... My beans when I fried them...before I added a glass of oil, now it's the smallest amount so that it releases the flavor and that's it.”

The 10-week program changed participant nutrition behaviors and increased health literacy. Mothers now commented that they could differentiate between healthy and unhealthy foods, were reading nutrition facts labels and intentionally increasing nutritious food access in their homes. “I look at the labels when I buy juice now and look at the label when I buy (food).”

Self-Efficacy and Time.

Even though health literacy increased with participants there were still many obstacles around improving health behaviors that were mentioned. Almost all participants said that time was an external factor that prohibited them from eating and preparing healthier foods. Many of the mothers mentioned that their job or their husband's job got in the way of suitable time schedule to eat and prepare meals. Many of the mothers mentioned that they had to wait until their husband was done with work to feed their family. Time was also a large factor for single mother participants. Mothers that were raising their children on their own not only had the responsibility to provide and plan meals but also needed to financially support the family. Working mothers found it the most challenging to provide healthy food for their children. Mothers that were employed stated that they had less time to prepare meals and would often arrive home late at night after dinner time for their children. "I do not sit down to eat because I always work at that time." Mothers mentioned that when they lacked the appropriate amount of time to plan and make a balanced meal they would resort to fast food. "I can do what is the easiest and what I can do the fastest so that's what I teach my children too." Another mother said, "Time that I spend away from home is what prevents me from eating healthier, because sometimes I take food from my work."

Many of the single mothers mentioned that they would prepare meals ahead of time and have them ready for the week. When mothers felt they had sufficient time to cook they also felt that they were capable to plan healthier meals for their family and

themselves. Time was the most common factor that was mentioned where mothers felt it was out of their power. “We have little time to make dinner together,” and “I do not have the time to sit down and eat it.” Time seems to be an impediment for all people when making dinner and is not solely a factor for this population. Time is only one of the many aspects that plays into self-efficacy with this population. Money is also a factor that contributes to mother’s self-efficacy around food and health of the family.

Money and Convenience.

As previously discussed finances are a barrier for many Latino families in the United States and around the globe (Gittelsohn et al., 2008). Many participants mentioned that when they went to grocery shop they picked the cheapest option when picking a product. Mothers said that they frequently shopped at Walmart and other super stores with the intent to find the cheapest food options. Interestingly, some mothers mentioned that buying fruits and vegetables were cheaper than buying junk, while most mentioned that buying junk was the least expensive option. They also said that they would buy the easiest food to prepare. Mothers continually mentioned that with more money they could buy fruits and vegetables. Mothers who mentioned healthy food was cheaper than junk food were also considering health impacts of what they were buying.

Money was a factor that all participants mentioned. “Food is where we struggle the most.” Mothers with a perceived locus of control were also the ones that mentioned money being less of a factor than other mothers who lacked self-efficacy. Some said that money was a factor that needed to be planned out. Food needed to be budgeted. Some participants clipped coupons to survive while others said that money was not a concern

and they could buy what they needed. Mothers also stated that they needed a job to have enough money to buy food, but when they had a job they had less time to prepare healthy meals. Money is a large factor for every family and can determine the quality and quantity of food products that are purchased not only for Latino families.

Table 10. Post 10-Week Weight Management Intervention Interview- Money Quotes:

Participant ID #	Interview Participant Quote:
005	“No, I believe that you can with the money that you have.” “I decide it (food) by the price.”
006	“...Healthy stuff sometimes is more expensive than the regular ones and sometimes, the ones that are like on sale they are not healthy choices.” “I use sometimes the store brand, those are cheaper and when they have sales ...that’s when I go.” “You can find healthy choices that are cheap out there.”
008	“When I look for food, I walk and walk to walk for cheap prices... I go to Walmart also...there are cheap and good things.”
011	“To eat healthy, you need more extra expenses, because the truth is that vegetables and fruits are more expensive.” “I buy the cheapest.”

Self-efficacy and External Factors.

Many interviewees mentioned factors that influenced her decision making around food. Mothers talked about scheduling issues and how some days they worked late, which made it more difficult to plan and prepare nutritious meals. Where other mothers said that their lack of literacy and transportation were barriers to their success. One mother had lost her hands due to septic shock during a pregnancy, which drastically changed her capabilities to provide for her family. For that mother, she mentioned that

food was the biggest struggle for her family. She was now unable to cook the way she used to since it was nearly impossible for her to cut foods, open materials and go about her life the way she had before the accident. When there are outside factors that seem to be out of their control mothers mentioned a lack of self-efficacy and that certain activities were difficult to accomplish or manage.

Self-efficacy and Nutrition Behaviors

Nutrition Beliefs.

Self-efficacy influenced mother's health and food beliefs. When asked about health foods and what participants perceived as healthy, all interviewees mentioned they believed fruits and vegetables were healthy. "I value more vegetables now because my kids eat it and it's good for them you know, it has a lot of fibers in it, which they were not consuming that before." During the intervention fruits and vegetables were a main lesson (Lesson #4) and were discussed in many other lessons as well. The importance of fruits and vegetables was reiterated to stress the importance of fiber, vitamins and minerals found within them. "Now they have more healthy snacks that they can eat. They eat more apples, they eat more bananas, I make shakes in the morning like with fruits and before I wasn't doing that."

Many participants mentioned that they were now eating whole grains or that they intended to eat whole grains in the future since they knew that it was more nutritious. Whole grains were also mentioned throughout the intervention, especially in Lesson #1. Mothers commented on how they were now increasing water consumption and

intentionally decreasing fruit juice and sugary beverages, which were main points of the lessons. “I say: no, no but is too much sugar for me. So now we go with more fiber...”

Less Meat.

Many mothers also discussed aspects of a balanced and healthy diet and that one should decrease the amount of meat that they consume. During nutrition lessons the importance of lean protein was mentioned but reducing meat for health was not a focus. Lesson plans encouraged participants to buy lean meat that had lower amounts of fat. Many mothers during interviews said that red meat and meat in general was not good for their body. Even after explaining that lean meat was the best options for health based on USDA guidelines, mothers specifically stated, “meat is bad” and “one must limit meat (for better health),” although this was not a significant focus of classes. Participants said that they were now consuming less fried meats and were now pan frying with minimal oil or boiling meat for healthier options. Since meat was not heavily discussed in lesson plans their knowledge around meat and health must be culturally learned.

Fear of Fat.

Participants also mentioned that fat was bad for you and seemed to be most concerned with fat when reading food labels, even though fat was not a heavy focus in lessons. “Eating too much harms you and eating a lot of fat more than anything.” Mothers said that they were decreasing fried foods and using less oils in their kitchen after the intervention. As fat was not a major focus of the intervention, this may indicate that fear of fat was encountered elsewhere. Mothers did not discuss healthy fats or that

some cooking oils are actually beneficial to health, including omega fatty acids (Omega-3 Fatty Acids Benefits, Uses, and List of Foods, 2018). The mothers seemed to lack this knowledge and were solely concerned with the negative impacts of fat on health. Mothers mentioned various reasons why they intended to avoid fatty foods including: the intent to limit fat from their diets to take care of their health, intent to limit fried and fatty foods to prevent weight gain, foods that are not greasy are healthier and that a lot of fat harms their health. Mothers feared fat because they felt fatty food had excess calories, ‘harms you’ and will make you gain weight. One mother mentioned, “Having a diet of eating fatty foods... must at least vary vegetables and fruits to have a healthy body, not to be very sick.” It was impressive that mothers took initiative to decrease fried foods, but it is concerning that they feared all fat and lacked the understanding that fat is also necessary for a healthy and balance diet.

Food Access.

Food access was mentioned many times where food access and assimilation seemed to be intertwined. Heading into the interviews it was anticipated that change in culture would have been heavily stated and be a large factor for many families when choosing foods and planning meals. But, assimilation and change in food environment was not mentioned to the degree expected. Many participants mentioned that once moving to the United States they had increased fast food access, which immediately changed their dietary habits. Many mothers mentioned that where they were born, fast food was a rare luxury since it was more expensive and less commonly found in their food environments. One mother said that when she came to the United States fast food

was so available and affordable her family “went a little crazy” and over consumed junk food. After the intervention she mentioned that she intentionally decreased her fast food intake even when they got coupons in the mail for fast food establishments she would discard them. Before the intervention she said she save the fast food coupons and used them consistently. Where pre-intervention she and her family would become excited about the discounts from various chain restaurants.

Some mothers mentioned how they were trying to change their traditions from their Latino culture to assimilate with American culture, “I do not allow them (my children) to consume coffee, which in my culture is natural and normal for the child to consume. Here in this country obviously not. Sugars and all that have decreased a lot.” Even though in her culture children drinking coffee is acceptable and normal she decided to change her actions in order to fit into her new culture. Fast food access in American culture was repeatedly mentioned during interviews. One mother said that, “I think that American gastronomy is junk.” Mothers were aware of the difference in their new food environment. Many mothers also said that they didn’t like American food and intended not to eat it, based on their exposure working in restaurants or the increased access of fast food since moving to this country.

Intervention Limitations

There were many limitations to this 10-week weight management intervention study. Participant adherence changed each week, which affected consistency of the results. Another limitation includes truthfulness while answering questions regarding

what foods were being eaten while answering Block FFQ questionnaires. Many times, it was difficult for children and families to accurately report portion sizes, which may also skew data. The time line of this intervention posed a limitation since it spanned 10-weeks, which was not a substantial amount of time for participants to change dietary behaviors. Longer interventions may show higher rates of significance since there would be more time to teach and remind participants how to live healthy lives. Parent's willingness to change, and parental role modeling success was a limitation, since it was their choice to take the information they were given each week and apply it to their lives.

Small sample size can also decrease statistical power, the ability to detect effects of study power. Effects are easier to detect in larger samples sizes and therefore increase the power of the study. A larger sample size would help narrow margin of error (Faber & Fonseca, 2014).

Block FFQ and 24-Hour Recall Limitations.

Block FFQ and 24-hour recall both have separate limitations. The standard deviation was quite high, which means that the sample size values are more spread out from the mean and have more variation with ranges of values. Both surveys regarded the dietary habits of the child participant but the Block FFQ was filled out by the parents where the 24-hour recall was conducted with the child participant. The Block FFQ was solely conducted pre and post-intervention by a parent reporting the child's dietary habits. Any guardian or parent of the child participant was allowed to fill out the Block FFQ, which in itself may have resulted in varying results. Since both surveys were filled out by different a person in regard to the same child there may have been unintentional

individual response variation. Twenty-four-hour recalls were also filled out once pre-intervention and once post-intervention where parental/guardian proxies were not always involved.

Children seemed to have difficulty with the 24-hour recall and may have unintentionally given inaccurate dietary recall information. The 24-hour recall had consistently higher results than the Block FFQ, which was different from existing literature (Kobayashi et al., 2011; Livingstone et al., 2004; Serdula et al., 2001). One possible cause for the difference in reporting could be the fact that this 10-week intervention solely conducted one 24-hour recall where many other interventions recorded three days of 24-hour recalls. For this 10-week intervention the 24-hour recall was only taken from one day pre-intervention and one day post-intervention. Many other studies record 24-hour recalls from two-week days and one weekend day to increase accuracy of results (MA et al., 2009).

Small sample size as previously stated is also a negative limitation. When a small sample size occurs statistical power decreases, if there was a larger sample size the margin of error would be reduced, and the confidence interval may contain a more accurate value of estimation.

Exit Survey Limitations.

Participants stated that they learned a lot from the intervention but would appreciate more Latino staff and more cultural sensitivity based on food and lessons. Having more Latino and fluent Spanish speaking staff would increase comfort of Latino

participants and would help to reduce barriers when it comes to learning. The survey was also vague and difficult for participants to give enough detail. However, participants were able to express themselves in greater depth during interviews.

Interview Limitations.

After reviewing interviews many limitations became more apparent. The fact that only women participated in the interviews shows that all the information is gender-biased and will not account for the entire picture around family and food dynamics. Many of the wording of the questions from the interview seemed to be above the literacy and competency level for some participants, which made it difficult for them to answer and understand what the researcher was asking. For future interviews it is important to use simple questions to ensure participants are comfortable and understand. Since most participants were not fluent in English, a Spanish translator was necessary, an inherent limitation. As the main researcher was not fluent in Spanish it was difficult to communicate and fully understand if the participant was answering the questions fully.

Another limitation of the interviews is that they were only conducted post-intervention. For better understanding with change of beliefs, values and attitudes it will be beneficial for future interventions to also conduct pre-intervention interviews. A final limitation of the interviews was the fact that many mothers came with their children, which was a distraction.

Researcher Bias.

Researcher bias is also a limitation. As a nutrition student for the past six years values and expectations around food and health influenced conduct and conclusions of

the study. Values around health are very specific and are dictated by learned knowledge. The researcher values eating healthy foods, including foods high in fiber, and decreasing less healthy foods such as processed foods. Researcher bias impacts results most significantly during interviews. The interviewer may have given subconscious subtle cues with body language or tone of voice that may have skewed the interviewees responses. Interview participants may have picked up on the importance of health from the interviewer and monitored what they said to please or satisfy the researcher. In order to reduce bias, the researcher minimized reactions.

Chapter 4: Conclusion

This mixed methods study gained understanding of Latino assimilation to the United States from Block FFQ, 24-hour recalls, exit surveys and interviews for the 10-week weight management intervention that focused on families with children above the 85th percentile for BMI, based on The Theory of Planned Behavior. While quantitative and qualitative data did not show significant food behavioral change, data offers evidence how assimilation influences dietary beliefs, attitudes, values, norms, self-efficacy and habits. Data did show that participants applied behavioral health knowledge from the nutrition lessons, showing decreases in whole milk, fruit juice and trans-fat and an increase in vegetable soup consumption. Variable changes were nutritionally favorable and matched what was taught in lesson plans. Even though there were significant variable changes for some foods, various barriers for Latino family health success were found surrounding gender, family and self-efficacy.

Block FFQ and 24-hour recalls described participants of the 10-week weight management intervention and understood changes in dietary habits. Future Block FFQ interventions should examine accuracy of parental proxy reporting compared to responses of the children themselves (Zhang et al., 2016). Future 24-hour recall interventions should be conducted over a 3-day period to increase validity, over the course of 2-week days and 1-weekend day to better understand the participant's diet. Future interventions

should also consider assessing child attitudes of the program and health behaviors, using a yes/no formatted Likert Scale, which has been shown to be successful (Mellor, 2014).

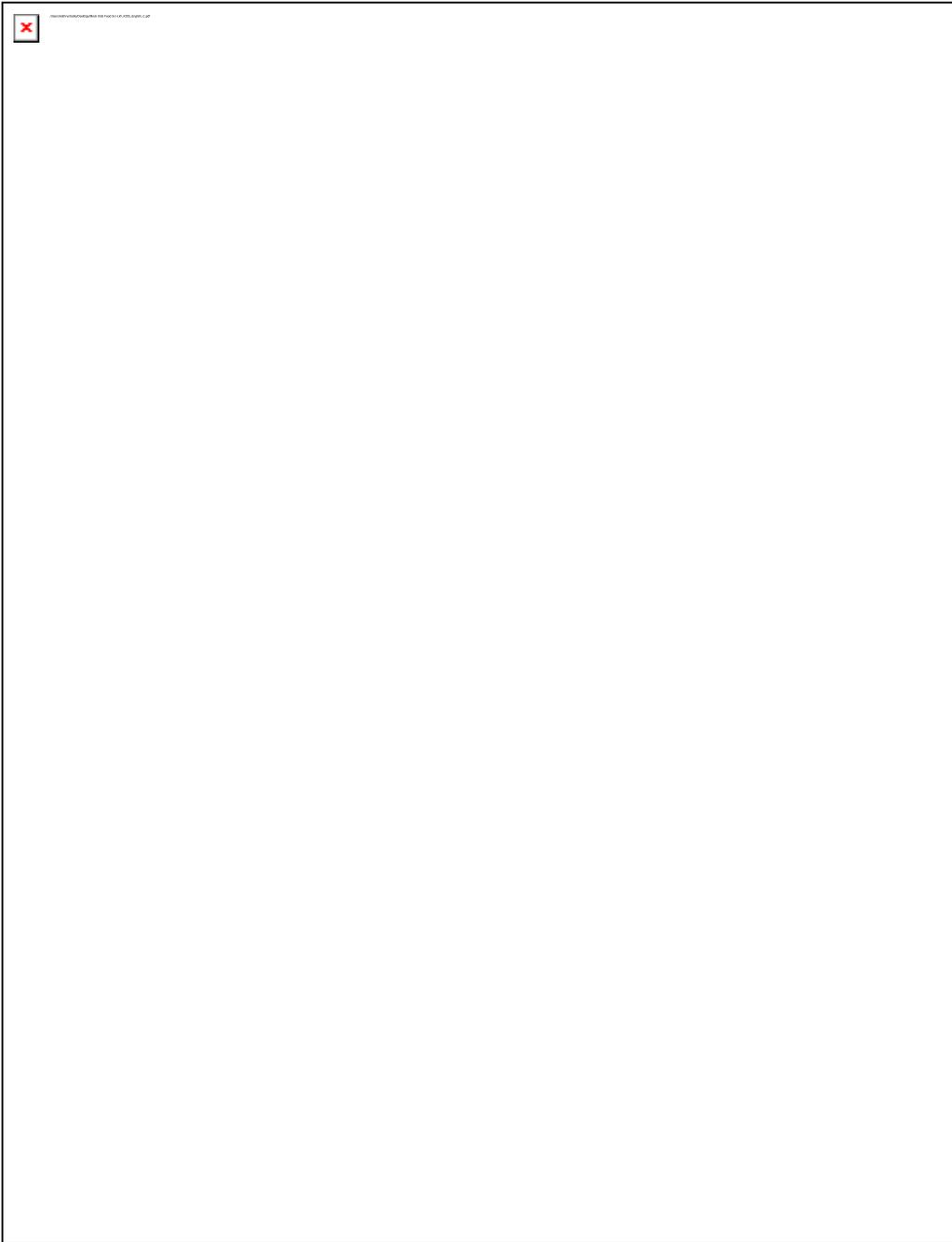
Interviews and exit surveys post-intervention developed a better understanding of Central American culture, values, beliefs and assimilation effects on dietary habits. For Latino family interventions, it is imperative to focus on women and the role they play within the family and home. All mothers from the study felt responsible for their family's health, the food they ate and the care of their children. Even though mothers are the primary caregiver of the household and food environment they are strongly influenced by family members and have many obstacles impeding their success. Latino gender role traditions need to be planned around with the understanding that the male may have much of the control.

Family support around making positive change should also be a focus for future intervention success. Understanding family roles, values and influences will be important, where interventions need to be aware that husbands tend to be an obstacle for mothers when trying to apply health knowledge. Since males tend to be seen as the protector and provider in Latino culture it may be helpful to incorporate this traditional gender role. Explaining the negative health impacts of obesity needs to go one step further, where the self-efficacy of fathers is increased so that they believe they are capable of protecting their family from poor health outcomes by being the provider and health care taker. Including fathers more prevalently in interventions may pose challenges but will result in better outcomes for family health when applying nutrition information.

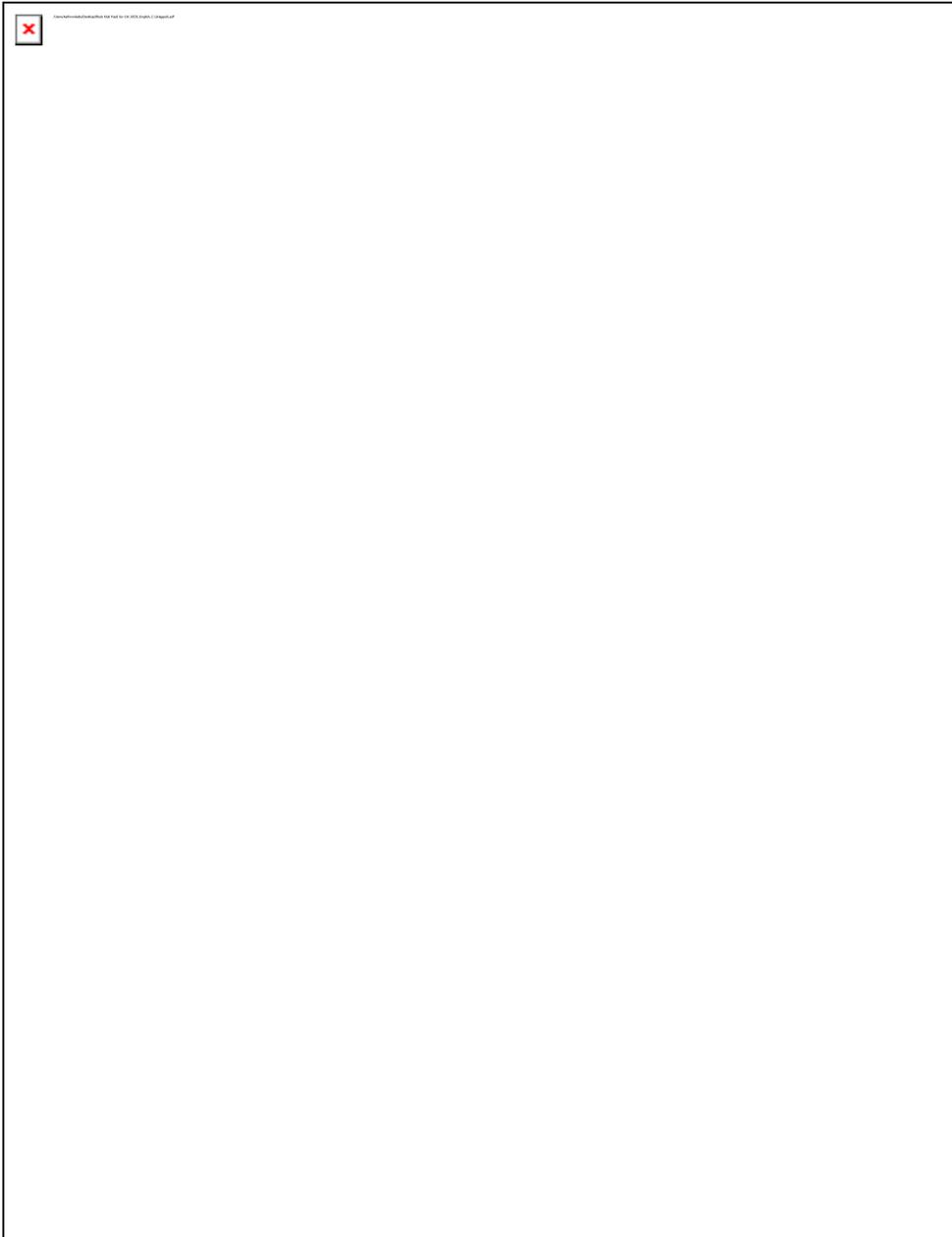
Finally, self-efficacy increased post-intervention where mothers said they were now capable of controlling portion sizes, providing more nutritious meals and could determine healthy versus less healthy foods. Participants were now able to read food labels and were aware of sodium, sugars, fats and cholesterol levels and intended to decrease access to sugary cereals, SSB, fast food and meat. Confidence and self-efficacy need to be an emphasis during interventions since positive attitudes have been shown to have most success with intention for healthy behavioral change.

While this intervention found impact with participant behavioral change it had limitations including: accuracy of Block FFQ and 24-hour recalls, lack of detail in exit surveys, and the fact that only women participated in post-intervention interviews, which needed a Spanish translator. Future interventions targeting Latino families should consider gender, family and self-efficacy as major themes around behavioral change. Obesity interventions need to reflect: how male and female gender roles effect the home dynamic, that family support and influence impacts dietary habits and balanced lifestyles and lastly, the importance of increasing self-efficacy in mothers around making healthy choices. This thesis gives insight into new and better ways to help this unique population stay healthy. Targeting obesity in low-income Latino minorities will help reduce serious health risks and improve overall population well-being. In 2018, childhood obesity is an epidemic in the United States and around the world but there is an increase in obesity and weight management interventions, which are essential for the health of future generations.

Appendix A. Block Food Frequency Questionnaire



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Appendix B. 24-Hour Recall

Paso 1	Paso 2	Paso 3	Paso 4	Paso 5
Lista rápida (Anote todas las comidas nombrados por el participante)	Comidas/Bebidas y Adiciones (Artículos identificados en la lista rápida)	Hora (Anote cuando la comida se consumió)	Modo de preparación –si es aplicable	Descripción de la comida / bebidas y cantidad de ingredientes
	1.	am pm		
	2.	am pm		
	3.	am pm		
	4.	am pm		
	5.	am pm		
	6.	am pm		
	7.	am pm		
	8.	am pm		
	9.	am pm		
	10.	am pm		
	11.	am pm		
	12.	am pm		

Appendix C. Parent Exit Survey Results Post Completion of the 10-Week Weight Management Intervention Study Spring 2017:

1. Did you like the location of the program? a. Yes b. No
2. Would you prefer a different space? a. Private office in community b. Other c. No
3. Did you feel the weekly lessons were educational and helpful? a. Yes b. No
4. How long should the program last? a. 10 weeks was just right b. 1 year c. 6 months
5. Would you have liked some sessions with other health professionals? a. Medical doctor b. Nurse or Nurse practitioner c. Social worker d. Other
6. Did you like having group education sessions with the other families participating in the study? a. Yes b. No
7. Please rate the Nutrition Educator in regard to clearness when conveying information:
8. Please rate the Behaviour Health Specialist/s:

<p>9. Do you think your child enjoyed the physical activities each week?</p> <p>a. Yes</p> <p>b. No</p>
<p>10. Did you feel all study staff were respectful of you and your family?</p> <p>a. Yes</p> <p>b. No</p>
<p>11. Did you feel you received enough nutrition education to help make better food choices for you and your child?</p> <p>a. Yes</p> <p>b. No</p>
<p>12. Did you feel you received enough physical activity information?</p> <p>a. Yes</p> <p>b. No</p>
<p>13. Did you receive enough group support?</p> <p>a. Yes</p> <p>b. No</p>
<p>14. Which lesson(s) did you like the best? Or find most helpful?</p> <ol style="list-style-type: none"> 1. Living a healthy lifestyle 2. Physical activity and sedentary time 3. Hunger cues, coping with urges and portion sizes 4. Fruits and vegetables 5. Reading food labels 6. Social Gatherings 7. Eating on a budget and grocery store tour 8. Decreasing fast food 9. Meal planning 10. Relapse/Lapse
<p>15. Which lesson(s) did you like the least?</p>
<p>16. What was the most valuable thing you learned from the 10-week weight management intervention?</p>
<p>17. What was the least valuable part of the 10-week weight management intervention?</p>

<p>18. Would you participate in the program if it were offered again?</p> <p>a. Yes</p> <p>b. No</p>
<p>19. Do you feel the program was worth your time?</p> <p>a. Yes</p> <p>b. No</p>
<p>20. How confident are you that you can help your child make healthy food and activity choices now?</p> <p>a. Not at all confident</p> <p>b. Much more confident then when the study started</p> <p>c. A little more confident</p>
<p>21. Did you like the food, which was offered during dinner?</p> <p>a. Yes</p> <p>b. No</p>
<p>22. What was your favorite meal?</p> <ol style="list-style-type: none"> 1. Chicken Arroz Aguado 2. Gallo Pinto with eggs 3. Encebollado Ecuatoriano (Fish stew) 4. Charquican Stew with Turkey 5. Chilean Cazuela 6. Chickpea stew with fish 7. Chicken Asopao 8. Cauliflower Arroz con Pollo 9. Sopi Mondongo 10. Lentil Soup with rice
<p>23. How could the program be improved? Or be more culturally relevant (i.e. include more information about Latino culture)?</p>
<p>24. Which types of positive changes have you seen in your child's behaviour since the study began?</p> <p>(Please select all that apply answer)</p> <ol style="list-style-type: none"> a. S/he chooses healthier foods more often b. S/he eats fewer unhealthy foods c. S/he eats more appropriate portions d. S/he is more physically active e. S/he walks more f. S/he drinks more water g. S/he spends less time playing video games
<p>25. How do you perceive <u>your child's</u> weight?</p>

- a. Underweight
- b. Normal weight
- c. Overweight
- d. Obese
- e. I don't know

26. In general, how would you rate your child's health?

- a. Poor
- b. Fair
- c. Good
- d. Excellent
- e. I don't know

27. In general, how would you rate your child's risk for disease?

- a. Low
- b. Normal
- c. High
- d. Very high
- e. I don't know

28. How do you perceive your weight?

- a. Underweight
- b. Normal weight
- c. Overweight
- d. Obese
- e. I don't know

29. In general, how would you rate your health?

- a. Poor
- b. Fair
- c. Good
- d. Excellent
- e. I don't know

30. In general, how would you rate your risk for disease?

- a. Low
- b. Normal
- c. High
- d. Very high
- e. I don't know

31. Would you be interested in being contacted in the future with additional information?

- a. Yes

b. No

32. Do you have any other comments or suggestions?

Appendix D. Interview Script

Objectives:

- Examine Central American and Mexican Latinos in the United States to understand effects of their beliefs, behaviors and attitudes on health and nutrition behaviors.
- Explore cultural acceptability with parents post completion of a weight management program for their children who are overweight/obese.
- Understand how Latino beliefs and attitudes towards food affect behavioral intentions and actions based on the Theory of Planned Behaviors?
- Understand how outside factors affect Central American and Mexican Latinos with how they perceive their ability to eat a healthy diet?

I. Purpose of the Meeting

Welcome to our meeting post 10-week weight management intervention, which was completed last May 2017. We are interested in understanding how to improve the 10-week intervention program. The goal of this current project is to try to understand how your values, beliefs and outside factors that may influence your behaviors around food, as parents of the children who completed the 10-week weight management intervention. You were invited here today to help us get a better understanding of how your attitudes and beliefs from your country of origin/country of ancestry affect and influence your dietary habits. During this interview we aim to get a better understanding

of how your culture affects your nutrition and dietary habits and how they influence changes when trying to live healthier lives. At any time, you are allowed not to answer a question or stop the interview. If you would like to move past a question or would like to come back to it later that is all right. During the interview we want you to be comfortable and as open with answers as possible.

II. Introductions

Let's spend the first few minutes of the meeting re-introducing ourselves. Tell us your name, your country of origin or country of ancestry. During this interview we are going to ask a broad spectrum of questions related to your diet, values, and behaviors. Do you have any questions before we start this meeting or anything you would like us to know?

III. Questions

Self-efficacy-

First let's talk about your beliefs about nutrition and healthy eating.

- Do you believe that your actions and decisions impact your health and why?

How do your actions and decisions impact your health and why?

- How do diet and food choices influence your health and why?

• With regards to your child do you believe they are at risk for diseases based on their weight or diet and why? Do you believe that you have control over the health of your child and why?

Normative beliefs-

Next let's talk about what influences the decisions you make around food.

- What influences your food and nutrition choices and why? (i.e. Money, local, comfort, convenience etc.) What affects the food choices you make and why?
- Who in your life influences the way you eat and why?
- Are there people in your life that influence your dietary behaviors (i.e Spouse, doctors, family?) Do the people who are important to you think that the family should eat a certain way and why?
- What are the roles in your home related to food and why? Who decides what and when food is prepared and eaten and why? Who makes the food?

Attitudes towards the behavior-

Now that we have talked about how food decisions are made in your home let's talk about how you feel about eating healthy.

- How do you feel about healthy foods and why? Do you want to eat healthy and why?
- Do you believe that you have the power to make changes to your life to improve your health and why? If not, what would you need to make better nutrition decisions to live a healthier life?

Change in Behaviors due to Assimilation to the U.S.-

Now that we have covered how you feel about healthy food let's talk about your diet here in the United States.

- If you have immigrated how has your diet changed and how long have you lived here and why? Since living here do you try to eat a more Americanized diet compared to your country of origin? (more meat, grains and fast food?)

- Are you eating less/same amount of traditional foods from your culture and why? (i.e. from El Salvador- Papusas? Plantains?) Do you follow traditions/recipes from your country with regards to what you buy and eat and why?

- A value is an attitude surrounding something that you think is important, useful or worthy. While living in America have your values around food changed and why? (i.e. what you think is healthy?)

Post intervention-

Let's discuss how things have been for you since you completed the 10-week weight management intervention.

- Since participating in the 10-week program do you believe that you can buy healthy food and why? How do you decide what food products to buy and why? (Do you read food labels when deciding on a product, look at unit prices, store brands?)

- What do you do differently relating to food now that you have completed the nutrition lessons and why?

Behavioral Intentions-

Now that we have covered changes in your life since the intervention let's talk about healthy eating on a day-to-day basis in your life.

- Do you believe you can eat healthy and why? What are outside factors (such as money, your homes location, family planning) that prevent eating a healthy and balanced diet in your house and why?

- Do you believe that you can cook healthy and why? What do you need to be able to cook healthy and why?

- Do you believe you can buy healthy food and why? What prevents you from buying health foods and why?

Cultural sensitivity of program or improvements?

Lastly let's talk about how the program felt for you based on Latino culture.

- Culturally sensitivity is being aware and respectful of values of different places and people. Are there ways to make the program more culturally sensitive or is there any information that you would like to share so that the program can be more appropriate next time and why? Do you feel that the intervention needs to be improved with regards to cultural issues and sensitivities?

IV. Conclusion

Thank you for your time. We appreciate your corporation and openness with answering these questions. Please feel free to contact the George Mason and 10-week weight management intervention Staff if you have further comments or questions. In appreciation of your time you will be compensated a \$50 gift card.

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Biography

Kathryn Tadio received her Bachelor of Science in Nutrition and Dietetics from the University of Vermont in 2016. She moved to Virginia in 2016 and earned her Master of Science in Nutrition from George Mason University in 2018. She is working towards becoming a registered dietitian with a focus in pediatrics and childhood obesity.