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Exploring the Nutrition and Physical Activity Knowledge, Attitudes, and Behaviors of Low-Income Parents of Peruvian Preschool Children

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EXPLORING THE NUTRITION AND PHYSICAL ACTIVITY KNOWLEDGE, ATTITUDES AND BEHAVIORS OF LOW-INCOME PARENTS OF PERUVIAN PRESCHOOL CHILDREN

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Kathleen McInvale

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To: Dean Tomás R. Guilarte
College of Public Health and Social Work

This dissertation, written by Kathleen McInvale, and entitled Exploring the Nutrition and Physical Activity Knowledge, Attitudes and Behaviors of Low-Income Parents of Peruvian Preschool Children, having been approved in respect to style and intellectual content, is referred to you for judgment.

We have read this dissertation and recommend that it be approved.

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Florida International University, 2017

DEDICATION

This dissertation is dedicated to a few special individuals who have made my doctoral journey and the completion of this dissertation possible. First, and foremost, I dedicate this to my husband Orlando. He has given his heart, time, money, sweat and tears to this dissertation, supporting me every step of the way. I am afraid I will never find words adequate enough to describe my love and appreciation for him, but I will keep trying every day. My parents, Lori and Jim, have always been my number one fans in what probably seemed to them like a never-ending school career. Their love and support is what inspired me to first embark on this doctoral journey, and it is what has allowed me to survive the process. I also dedicate this to my Peruvian friends and family, the Nieto and Trejo families, who housed and fed me during my extended trips to Peru, and served as my team on the ground during the times I could not be there. What an amazing international team they have been for me! And finally, I am forever grateful to my FIU family, my colleagues and mentor. My FIU cohort, Rachel Clarke and Kemesha Gabbidon have always been a quick text, e-mail or call away, continually saving me with answers to my last minute questions and keeping me laughing and sane. I look forward to witnessing the amazing things these two women will do in their careers. Dr. Shaw, my mentor, has been a never-ending source of patience, refusing to give up on me even at times when I myself wasn't sure I could do it. She has pushed me and challenged me, accepting nothing less than my best work, but always providing me with the tools I needed to reach those expectations. She has served as a model to me and my classmates of what it means to be successful woman in research, balancing work and family, something I will continually strive to achieve in the next phase of my academic journey.

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ABSTRACT OF THE DISSERTATION

EXPLORING THE NUTRITION AND PHYSICAL ACTIVITY KNOWLEDGE, ATTITUDES AND BEHAVIORS OF LOW-INCOME PARENTS OF PERUVIAN PRESCHOOL CHILDREN

by

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Miami, Florida

Professor Mary Shaw, Major Professor

Obesity and related chronic diseases are emerging public health issues among children in Peru, where more than 13 percent of children five years and younger are overweight or obese. Although parents have been identified as one of the most important determinants of healthy weight in young children, there are no known studies that have explored the perceptions of Peruvian parents regarding obesity prevention. This study assessed the nutrition and physical activity knowledge, attitudes and behaviors of Peruvian parents, and sought to determine if there is a relationship between their knowledge, attitudes and behaviors. The cross-sectional survey study sampled 204 parents of three and four-year-old children attending five preschools in a resource-poor Southern Lima setting. The Pen-3 cultural model guided the assessment of parental characteristics using the BAQ-HH survey across three domains; knowledge, attitudes, and behaviors regarding diet and physical activity. Additional data was abstracted from school records to assess children's BMI and compare parental perceptions of child's weight with child's measured weight status. Parent respondents were predominantly

female (86%) between 20 and 39 years old (85.1%). Less than one third (30.5%) were receiving information about nutrition or physical activity. Data was available for 147 children of the participants, 53.7 % were female with a mean age of 49.4 months and a mean BMI of 16.7. Nearly half the children (41.3%) exceeded healthy weight. Parents demonstrated healthy knowledge and behaviors, but unhealthy attitudes. Parental knowledge and attitudes were predictive of behaviors ($F(2,166)=5.826$, $p=0.004$, $R^2=0.066$). The majority (56.6%) of Peruvian parents accurately perceived their child's weight status but 9.6% of parents of overweight and obese children were able to do so. Understanding the nutrition and physical activity knowledge and perceptions of Peruvian preschooler parents can advance local and national health ministry and public health obesity prevention initiatives for young children.

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ABBREVIATIONS AND ACRONYMS

BAQ-HH	Behavior and Attitudes Questionnaire about Healthy Habits
BMI	Body Mass Index
CDC	Centers for Disease Control and Prevention
KABs	Knowledge, Attitudes and Behaviors
SJM	San Juan de Miraflores, Peru
UGEL	Unidad de Gestión Educativa Local, Local Education Management Unit
WHO	World Health Organization

CHAPTER I

INTRODUCTION

Background

The obesity epidemic is a global health crisis. In just the thirty-year span between 1980 and 2010, the worldwide prevalence of obesity doubled (Perez Rodrigo, 2013). The excess weight problem affects people across the lifespan, particularly within developing countries (Popkin, 2004). One in five children are now overweight or obese, and the majority of these children live in low and middle-income nations (Perez Rodrigo, 2013). In fact, 35 million of the 43 million overweight children live in developing nations (Onis, 2012). Moreover, the rate of growth of obesity and overweight prevalence in young children is highest in these low and middle-income countries (Perez Rodrigo, 2013). One region particularly vulnerable to the global childhood obesity crisis is Latin America (The Lancet Diabetes & Endocrinology, 2014).

Obesity and related chronic diseases have now become the most important public health concern in Latin America (The Lancet Diabetes & Endocrinology, 2014). Since 1980, the average BMI of a Latin-American individual has increased each decade at rates double the global average. Obesity is an issue even amongst children in the region, with childhood overweight and obesity rates up to 25 percent in some countries across Central and South America (The Lancet Diabetes & Endocrinology, 2014).

Peru is one such Latin American country undergoing a nutrition transition, in which the prevalence of malnourishment among children in Peru is declining while the rate of obesity is increasing (Busse & Diaz, 2014; de Mola, Quipse, Valle, & Poterico, 2014). Urbanization and globalization have contributed to an increase in sedentary

lifestyles and decreased physical activity among Peruvians living in the urbanized areas of Lima and the coast, (de Mola, Quispe, Valle, & Poterico, 2014). More than one third of children living in Lima are either overweight or obese, a rate which exceeds that of children in the United States (de Mola, et al., 2014, Busse & Diaz, 2014). Prevalence of obesity and overweight is on the rise even amongst the youngest children, with 13.1 percent of children 5 years or younger in Lima now being either obese or overweight (Busse & Diaz, 2014; Uauy, Albala, & Kain, 2001). The Peruvian government has recognized the excess weight crisis among Peruvians and issued a National Strategic Plan for healthy eating and weight reduction, however no specific action plans for young children were included (Chaparro & Estrada, 2012).

Early intervention is critical for Peruvian children, as children who are overweight or obese are more likely to become overweight or obese adults, putting them at risk for both immediate and long-term deleterious health outcomes (Trevino, Vasquez, Shaw-Ridley, Mosley, Jechow, & Pina, 2014, Trost, Sirard, Dowda, Pfeiffer & Pate, 2003). One of the most important determinants of overweight and obesity in children is parents, as they largely control opportunities for, and model, obesity preventive behaviors such as physical activity and nutrition (Baughcum, Chamberlin, Deeks, Powers, & Whitaker, 2000). Although parents serve as powerful role models and gatekeepers of nutrition and physical activity opportunities, the literature suggests that culture may be a moderator of parental influence (Eyre & Duncan, 2012; Baughcum, et al., 2000). Culture in this context refers to the values, norms, and codes that potentially inform beliefs, attitudes and behaviors (Airhihbenwa, 1995). Culture shapes normative beliefs about obesity and obesity preventive behaviors such as diet and physical activity.

While there is extensive literature on Hispanic parents and their knowledge, attitudes and beliefs about obesity and obesity prevention, much of it is focused on Mexican-American parents (Sosa, 2012). Unfortunately, there is a dearth of information in the literature examining the influence of culture on Peruvian parent's perceptions about obesity preventive behaviors (Caprio, Daniels, Drewnowski, Kaufman, Palinkas, Rosenbloom and Schwimmer, 2008). The study is relevant as Peru is transitioning from malnutrition to obesity as a predominant concern facing Peruvian children in urban areas (de Mola, Quispe, Valle, Poterico, 2014, Busse and Diaz, 2014). Prior to this study there had been no research to understand parental influence on obesity preventive behaviors for Peruvian preschoolers. Before engaging Peruvian public health researchers in designing home-based obesity prevention interventions, it is essential that they have a baseline understanding of parental knowledge, attitudes and behaviors (KABs) related to nutrition and physical activity.

Statement of the Problem

Peru has established a National Strategic Plan for adult and childhood obesity which includes goals for decreasing the percent of children under five years of age who are overweight and obese by 2021, however no specific strategies for achieving these reductions have been issued. Cultural norms influence parents' perceptions of childhood obesity as well as their perceptions about obesity preventive behaviors. In preschool children, parental influence is one of the strongest determinants of overweight and obesity (Vollmer & Mobley, 2013). A prerequisite to engaging Hispanic parents in childhood obesity prevention efforts is to understand their KABs. (Baughcum, et al, 2000). Peru like many other developing countries has an emerging childhood obesity

problem. Currently Peruvian researchers and policy makers have launched school-based initiatives to provide healthier meals to low-income children (PAHO, 2014). However, they have not yet developed home-based approaches for engaging parents in childhood obesity prevention. The proposed study addresses a gap in the literature necessary to advance Peruvian government efforts to reduce the prevalence of obesity and overweight among children 5 years and younger.

Purpose of the Study

The purpose of the study is twofold:(a) assess Peruvian parents' knowledge, attitudes, and behaviors regarding home-based nutrition and physical activity for their preschool aged children; and (b) determine if there is a relationship between nutrition and physical activity knowledge, attitudes, and behaviors of the parents.

Importance of the Study

The Peruvian government and Ministry of Health recently recognized the growing problem of overweight and obesity in both children and adults by passing the 2011 "Estrategia Sanitaria Nacional de Alimentacion y Nutricion Saludable" (National Health Strategy for Healthy Feeding and Nutrition), which set a goal of reducing overweight and obesity amongst Peruvian adults and children by 2021(Chaparro & Estrada, 2012). As a result of this initiative, specific strategies have been identified to combat overweight and obesity among Peruvian adults and adolescents, however no specific strategies to address the growing weight problem amongst the youngest Peruvians have emerged. The results of this study can inform Peruvian government and public health officials about the essential nutrition and physical activity knowledge, attitudes, and behaviors among Peruvian parents of preschool children. This new knowledge about healthy habits related

to nutrition and physical activity in the preschooler's home environment can support the planning and implementation of interventions to prevent overweight and obesity in young Peruvian children, as well as inform the development of national obesity prevention initiatives.

Theoretical Foundation

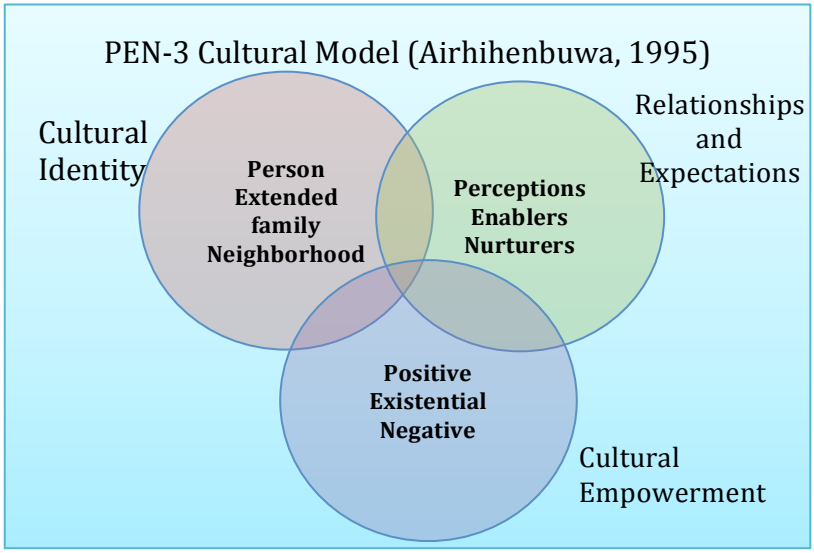
The literature has established that healthy weight promoting behaviors, such as diet and physical activity may be subject to cultural and ethnic variation. Moreover, parental influence on childhood obesity may vary by culture and ethnicity (Eyre & Duncan, 2012). Culture can influence perceptions or judgments about behaviors within a given society (Mazrui, 1986). Culture has been shown to influence such behaviors as child feeding practices and values such as what constitutes overweight and obesity in children. Since this study explored a poorly understood phenomenon about childhood obesity prevention unique to Peruvian parents, the Pen-3 Cultural Model was selected as the conceptual framework for exploring the perceptions (what people know and their attitudes) and behaviors. This model was selected after a careful review of the literature to identify other plausible culture frameworks to understand health behavior. Airhenbuwa's Pen-3 Model (1995), originally developed to facilitate design of culturally appropriate approaches to HIV/AIDS interventions in Africa, has been applied to a wide spectrum of public health issues, and recognizes the central role of culture in health beliefs and behaviors (Iwenlunmore, Newsome, & Airhihenbuwa, 2013). The model proposes three domains to be considered in order to understand behavior within a cultural context: cultural identity, relationships and expectations, and cultural empowerment. (Iwelunmor, et al., 2013).

Pen-3 Model

The Pen-3 model is represented in Figure 1 below and was used in the study with permission from the author (Appendix 1).

Figure 1

Pen-3 Cultural Model (Airhihenbuwa, 1995)



Pen-3 Domains. Domain 1: Relationships and Expectations:

Relationships and Expectations domain includes three constructs: perceptions, enablers, and nurturers. Together, these constructs examine the attitudes, resources and familial influence that support or hinder a health behavior. (Airhihenbuwa & Webster, 2004; Webster, 2003).

Domain 2: Cultural Empowerment:

Cultural empowerment includes positive, negative, and existential values, beliefs and relationships that affect the behavior change of interest (Airhihenbuwa & Webster, 2004).

Domain 3: Cultural identity:

Cultural identity includes the individual, extended family, and the neighborhood in making health decisions (Webster, 2003). The cultural identity domain includes three possible levels of intervention or exploration for a health belief or health behavior; person, extended family, and neighborhood (Iwelunmor, et al., 2013). Table 1 below provides a description of overlapping domains and constructs within Pen-3.

Table 1

Overlapping Domain and Constructs within Pen-3 (Airhihenbuwa & Webster, 2004; Webster, 2003).

	Positive	**Negative**	**Existential**
Perceptions	Knowledge, attitudes and beliefs that positively influence health behavior of interest (physical activity/nutrition), affecting the individual, family, and the community	Knowledge, attitudes and beliefs that negatively affect behavior of interest (physical activity/diet)	Aspects unique to a culture that include knowledge, attitudes, and beliefs
Enablers	Availability, accessibility, acceptability, and affordability of resources to support positive behavior change.	Refers to lack of available, accessible, acceptable, and affordable resources needed to promote positive behavior of interest.	Availability, accessibility, acceptability, and affordability of unique resources present within the community
Nurturers	The degree to which attitudes and behaviors are positively influenced, mediated and nurtured by extended family, friends, peers, and community.	The degree to which attitudes and behaviors are negatively influenced, mediated and nurtured by extended family, friends, peers, and community.	To degree to which attitudes and behaviors are influenced, mediated and nurtured by extended family, friends, peers, and community in a unique way.

Pen-3 Application. The Cultural Identity domain was used in conceptualization of the study and assisted in determining what the most appropriate point of entry would be in order gain an understanding of home-based nutrition and physical activity KABs for preventing childhood obesity in the Peruvian community. Following an initial review of the literature on the health behavior of interest, childhood obesity prevention, parents

were identified as the most appropriate point of entry for a study aimed at understanding obesity prevention in Peruvian preschool children.

The other two Pen-3 domains, Relationships and Expectations and Cultural Empowerment, were utilized to explore parental perceptions about nutrition and physical activity. Specifically the study sought to understand what knowledge parents have regarding physical activity and diet, what attitudes they hold, and what behaviors they exhibit, within the context of the Peruvian culture. The BAQ-HH Questionnaire, with permission of the author (Appendix 2), was used to measure knowledge, attitudes and behaviors that align with the constructs of these two domains.

The Relationships and Expectations domain includes three constructs: Perceptions, Enablers, and Nurturers. Perceptions are attitudes the individual holds towards the health behavior of interest. Enablers are societal or structural resources that facilitate or hinder the individual from engaging in healthy behaviors. Nurturers are individuals who support health seeking behaviors and decisions (Iwelnunmore et al, 2013). Collectively these constructs characterize knowledge and attitudes of participants regarding the health problem or behavior of interest, which in this study was physical activity and diet. Table 2 below outlines the BAQ-HH items by construct in the Relationship and Expectations domain.

Table 2

BAQ-HH Items Classified by Relationship and Expectations Constructs

Pen-3 Construct	BAQ-HH Variable	Questionnaire Item
Perceptions	Knowledge	I think that these issues matter for my family's good health: -the portion size of food. -the amount of sugar in food. -eating fruits and vegetables. -cutting down on sodas. -having healthy foods at home. -balance eating with physical activity. -cutting down on screen time TV, computer, and games.
Perceptions	Attitudes	I worry about: -my child eating too much when I'm not around. -my child having to diet to keep a good weight. -a lack of low cost and safe places for my child to be active. -a lack of physical activity or sports time for my child.
Perceptions	Attitudes	For your child's age, would you consider your child's weight to be…
Nurturers	Behaviors	10) Things I would like to do to improve the food and physical activity habits of my family:
Enablers	Behaviors	Things I would like to do to improve the food and physical activity habits of my family:
	Knowledge	Are you currently receiving information on healthy eating and/or physical activity for your family or children?
	Knowledge	If you answered yes to the previous question, what is the source of that information (school, government, community organization or other- please indicate)?
	Behaviors	If you answered yes to Question 16, do you find this information helps you to make healthy diet and physical activity decisions for your family or child?

The Cultural Empowerment domain explores Positive, Negative, and Existential beliefs and behaviors regarding a health problem (Iwelunmor, et al., 2013). Positive is defined as beliefs and practices that support healthy behaviors, negative are beliefs and practices that hinder or serve as barriers to healthy behaviors, and, existential are beliefs and behaviors that do not negatively impact healthy behaviors (Iwelunmore, et al, 2013). Table 3 below outlines BAQ-HH items by construct within the Cultural Empowerment domain.

Table 3

BAQ-HH items Classified by Cultural Empowerment Constructs

Pen-3 Construct	BAQ-HH Variable	Questionnaire Item
Positive	Behaviors	In a typical week, how often does your child eat dinner with at least one parent? In a typical week, how many days does your child do something active?
Positive/ Negative/Existential dependent upon response	Behaviors	I usually -decide my child's portion size. -decide if my child is eating healthy foods. -Ask about what my child eats at school. -Serve meals at a regular time. -Serve fruits and vegetables with meals. -Eat meals with my child. -Talk about the value of a healthy diet. -Push my child to play outside. -Talk about the value of physical activity. Things I would like to do to improve the food and physical activity habits of my family:
Negative	Behaviors	In a typical day at home, about how many servings of sweetened drinks does your child drink? In a typical week, how often does your child eat fast food like burgers, fries, hot dogs, or chicken nuggets? In a typical day at home, how much television or computer time does your child have?

Research Questions

The research questions that will guide the study are as follows:

1. What are Peruvian parents' knowledge, attitudes, and behaviors about home-based nutrition and physical activity for their preschool-aged children?

2. What is the relationship between Peruvian preschool parents' nutrition and physical activity knowledge and attitudes with their nutrition and physical activity behavior?
3. What proportion of Peruvian preschool parents' accurately assessed their child's weight status?
4. What is the relationship between Peruvian preschool parents' demographic characteristics and their ability to correctly evaluate their child's weight status?

Hypotheses

Question 2. What is the relationship between Peruvian parents' nutrition and physical activity knowledge and attitudes with home-based nutrition and physical activity behaviors?

H1. There is no relationship between preschool parent knowledge of physical activity and nutrition and their home-based physical activity and nutrition behaviors.

H2. There is no relationship between preschool parent attitudes about physical activity and nutrition and their home-based physical activity and nutrition behaviors.

Question 4. What is the relationship between Peruvian preschool parents' characteristics and their ability to correctly evaluate their child's weight status?

H1. Demographic characteristics of Peruvian preschool parents are not related to their ability to correctly identify their child's weight status.

H2. Preschool parents' physical activity and nutrition knowledge is not related to their ability to correctly evaluate their child's weight status.

H3.Preschool parents' physical activity and nutrition attitudes are not related to their ability to correctly evaluate their child's weight status.

H4. Preschool parents' physical activity and nutrition behaviors are not related to their ability to correctly evaluate their child's weight status.

Delimitations

The study was delimited by the following:

1. Participants were over the age of 18.
2. Participants were limited to persons who self-identify as Peruvian.
3. Participants were able to speak and understand Spanish, English or both.
4. Participants resided in Lima, Peru.
5. Participants were the parents of at least one three-or four-year old child currently attending a preschool in southern Lima, Peru.

Limitations

The study was limited by the following:

1. Sampling was non-random, convenience sampling from parents of children attending preschools in southern Lima, Peru, thereby limiting generalizability of the findings to all Peruvian parents.
2. Sampling of participants occurring at the preschool centers limited participation to parents of three-and four-year old children, restricting generalizability of the findings to parents of preschool children of other ages (two and five years old).

Assumptions

The following assumptions were made:

1. Participants responded honestly to all questions in the survey.
2. Participants and their children self-describe as Peruvian.
3. Participants were able to read and write in either Spanish or English.
4. Participants were the primary caregiver for their preschool child.
5. Preschool children of participants have no chronic medical conditions restricting their diet or preventing them from engaging in physical activity.

Definition of the Terms

Culture- Shared values, norms, and codes that collectively shapes a group's beliefs, attitudes and behaviors (Airhihenbuwa, 1999).

Body Mass Index (BMI)- Body mass index is an anthropometric measure derived by dividing weight in kilograms by height in meters squared, a measure which is used to determine whether a person's weight falls within a healthy range.

Obese (childhood)- Children having a body mass index-for age 3 Z-scores above the median for their age and sex (WHO Weight-for-age, 2017).

Overweight (childhood)- Children having a body mass index-for age 2 Z-scores above the median for their age and sex (WHO Weight-for-age, 2017)**.**

Perceptions- The knowledge and attitudes that an individual holds towards a health behavior.

Peruvian- Anyone who is resident in Lima, Peru and who describes himself or herself to be of Peruvian origin. (Flegal, Ogden, & Carroll, 2004)

Preschool child- A child who is three or four-years of age.

Organization of the Study

The study is organized into four sections; a review of the relevant literature, a description of the methods, analysis of the data and finally a discussion of the results. Chapter 2 provides a thorough review of the relevant and recent literature related to childhood obesity in Latin America and specifically Peru. It will describe the influence of parents on weight in preschool children, including the role that culture plays in shaping parental influences, preschool nutrition and physical activity behaviors and interventions done with preschool children. Chapter 3 describes the study sample and the methods the study employed to collect the data and answer the research questions. Chapter 4 presents the results of the research questions following analysis of all data. Finally, Chapter 5 concludes the study with a discussion of the major findings, implications for public health and recommendations for future research.

CHAPTER II

LITERATURE REVIEW

In order to gain a thorough understanding of the emerging overweight and obesity problem among Peruvian children, the following chapter will present a literature review exploring the relevant research. The review will begin with a discussion of the current obesity epidemic, both globally and locally in Peru. This will be followed by a discussion of the literature on the importance of early intervention during the preschool years. Then, the literature on the scope of parental influences on preschools children's weight will be presented. Preschool children's obesity preventive behaviors including their physical activity and diet will then be discussed, and finally a brief review of obesity prevention interventions conducted will conclude the review.

An extensive review of the literature describing social and familial factors related to overweight and obesity preventive behaviors in preschool children, specifically within Latin America and the Peruvian population, were identified and included in the review. Because of the limited body of published research on obesity in preschool children living in Latin America, literature focused on Hispanic children in the United States was included in the review. Furthermore, the review depicts current knowledge of the influence of parents on preschool children's physical activity and nutrition behaviors as it relates to their obesity levels.

Literature Review Methodology

The review of the literature was conducted by electronic search with the assistance of a research librarian for all relevant peer-reviewed journal articles related to obesity and physical activity and nutrition in Peruvian preschool children. Electronic

databases used in the search included PubMed, MEDLINE, EMBASE and CINAHL. Supplemental searches of the reference sections of relevant articles were done. An electronic search of Google Scholar was included as well. Search terms identified and used included: Peru, Peruvian, Lima, Hispanic, Latin, preschool children, preschool, young, child, overweight, obesity, physical activity, exercise, outdoor play time, nutrition, diet, eating behaviors, parent, parental influences, mother, and father.

Due to the substantial increases in childhood obesity beginning in the late 1980s, studies included in the review were limited to only those done in or after 1990 to maximize relevancy. The search was limited to only articles published in the English language. An initial search of literature was done January through April of 2014 and was repeated in March of 2016 and again in January of 2017 to identify any new and relevant references.

The first of four primary sections included in this review will begin by describing the current obesity epidemic, beginning with a global perspective, followed by a more specific discussion of obesity in Latin America, and finally the current state of the obesity epidemic among children in Peru. The next section will discuss parental factors that influence childhood obesity levels, including; parental perceptions, culture, parental weight status, parental physical activity behaviors, and parental support behaviors for physical activity and nutrition. The third section will discuss physical activity and nutrition as protective factors for preventing childhood obesity, including a description of diet among preschoolers globally and more specifically in Latin America. The review concludes with a discussion of preschool obesity interventions that have been done.

The Obesity Epidemic

Global Obesity

The ongoing obesity epidemic is a global phenomenon, occurring in both developing and developed countries worldwide. In the thirty-year span between 1980 and 2010, the worldwide prevalence of obesity doubled (Perez Rodrigo, 2013). In developed countries, such as the US, more than a third of adults are obese and obesity related diseases are the leading cause of preventable deaths (Adult Obesity Facts, 2016). Obesity disproportionately affects racial and ethnic groups within developed countries. More than 40 percent of Hispanic adults living in the US are obese and Hispanic children have the highest rates of obesity (21.9 %) as compared to any other racial or ethnic group (Adult Obesity Facts, 2016, Childhood Obesity Facts, 2016).

While the prevalence of overweight and obesity among populations in developed nations remains high, rates of overweight and obesity in developing nations are increasing rapidly (Obesity and Overweight, 2016). Overweight and obesity among populations in developing countries is increasing at 2 to 4 times the rate of the US and Europe (Popkin, 2004). Not only is the prevalence of overweight and obesity increasing at drastic rates in developing countries, the obesity epidemic is occurring at a much earlier stage of economic development as compared to more developed nations (Popkin, 2004).

Obesity is a global public health issue across the lifespan. The incidence of overweight and obesity has increased even amongst the youngest children, those under five, drastically in recent years (Sacco, de Castro, Euclydes, Souza, & Rondo, 2013). Worldwide, one in five children are overweight or obese (Perez Rodrigo, 2013). There

are 43 million overweight children globally, and 35 million of these children live in developing countries (de Onis, Blossner, & Borghi 2012). In the US alone seventeen percent of children are obese, however progress is being made as obesity prevalence has been declining among 2-5 year olds over the last decade (Childhood Obesity Facts, 2016). While the prevalence of overweight and obesity in children are still the highest in upper-middle income countries, the rate of growth of obesity prevalence in young children is highest in low and middle-income countries (Perez Rodrigo, 2013).

Obesity in Latin America

Many countries in Latin America are undergoing a nutrition transition in the midst of rapid economic development. This nutrition transition across Latin America has resulted in increased prevalence of overweight and obesity and decreased prevalence of stunting (Atalah, Amgio & Bustos, 2012). Even where stunting exists, there is now the double burden of stunting and excess body weight. Economic development and income growth in Latin American countries has resulted in increased access to food, particularly high caloric low cost food, a contributing factor to the nutrition transition in Latin American countries (Atalah, et al., 2012).

Obesity and related chronic diseases have now become the most important public health concern in Latin America (The Lancet Diabetes & Endocrinology, 2014). Since 1980, the average BMI of a Latin American individual has increased each decade at rate double the global average. While obesity trends are leveling off in many developing countries, this is not the situation in Latin America (The Lancet Diabetes & Endocrinology, 2014). Obesity prevalence in the adult populations of Mexico and Chile equal that of the US, with more than a third of adults being obese. Similar rates are found

throughout the region, such as Brazil, where one in five adults are obese (Kain, Hernandez Cordero, Pineda, de Moraes, Antiporta, Collese, Costa de Oliveira Forkert, Gonzalez, Miranda, & Rivera, 2014).

The rise in obesity has important implications for the health of the region. The high prevalence of obesity in Latin America has led to the increased burden of obesity related diseases, such as Type II diabetes. Combined prevalence of diabetes and pre diabetes rates are as high as 31.8 percent in Chile and Uruguay and 26.9 percent in Peru (Shen, Kondal, Rubinstein, Irazola, Gutierrez, Miranda, Bernabe-Ortiz, Lazo-Porras, Levitt, Steyn, Bobrow, Ali, Probhakaran, & Tandon, 2016). Prevalence of metabolic syndrome exceeds 40 percent of the adult populations in Mexico and Ecuador, well in excess of the prevalence in the US population (Cuevas, Alvarez, & Carrasco, 2011).

Obesity is an issue even amongst children in Latin America, with childhood overweight and obesity rates up to 25 percent in some Latin American countries (The Lancet Diabetes & Endocrinology, 2014). It is not a problem specific to one country. Combined childhood overweight and obesity prevalence is 36.9 percent in Mexico, 33.5 percent Brazil and 31 percent in Chile (de Onis, 2015, Rivera, Gonzalez de Cossio, Pedraza, Aburto, Sanchez, & Martorell, 2013). Even in Latin-American countries with lower obesity rates, such as Colombia, it is a growing problem. Trend analysis indicates that obesity rates may be leveling off in countries such as Mexico, but increasing in prevalence in countries like Colombia and Peru (Rivera et al., 2013). Amongst the youngest children, those under 5, obesity rates in Peru exceeded or equaled Chile and Mexico, countries with the highest prevalence of childhood overweight and obesity in the region (Rivera et al., 2013).

Obesity in Peru

Peru is suffering from a double burden of stunting and overweight/obesity within their population (Chaparro & Estrada, 2012). Excess body weight is prevalent among Peruvians of all ages, with the majority (62.3%) of the population of adults ages 30-59 years old being either overweight or obese (de Mola, Quispe, Valle, & Poterico, 2014, Alvarez-Dongo, Sanchez-Abonto, Gomez-Guizado, & Tarqui-Mamani, 2012). Obesity afflicts nearly a quarter of adult women living in Andean nations such as Peru (Carrillo-Larco, Miranda, Bernabe-Ortiz, 2016). Peruvians living in urban areas are at greater risk of being overweight and obese and are also more likely to be less physically active (Masterson, Creber, Smeeth, Gilman, & Miranda, 2010).

Childhood obesity and overweight has been on the rise in Peru since 1990, while simultaneously stunting and wasting decreased among children during this time period (Loret de Mola et al, 2014). Prevalence of childhood obesity and overweight are higher in urban Peru than in neighboring countries (Carillo-Larco, et al, 2016). In 1985 only 3.7 percent of Peruvian preschool children were obese, a figure which grew by fifty percent to 7 percent by1996, and has continued to grow and exceed 10 percent today (Jacoby, Goldstein, Lopez, Nunez, and Lopez, 2003, Urke, Mittlemark, & Valdivia, 2014). Risk factors indicate that overweight and obesity is most common among Peruvian preschool aged children who were male, living in Lima and the surrounding urban coastal areas, those born at a high birth weight, and who slept less than 10 hours per night (Loret de Mola et al, 2014, Pajuelo-Ramirez, Miranda-Cuadros, Campos-Sanchez, & Sanchez-Abanto, 2011, Urke et al, 2014).

Overweight and obesity have increased among children in both rural and urban Peru, but is increasing most rapidly among urban dwelling Peruvian children. Among five to nine year old children living in Peru nearly 25 percent are overweight or obese (Carrillo-Larco, Bernabe-Ortiz, and Miranda, 2014, Busse & Diaz, 2014). More than 13 percent of preschool children living in Lima and the surround urban areas are overweight or obese (Busse & Diaz, 2014, Alvarez-Dongo, et al, 2012, Pajuelo-Ramirez et al, 2011). Dietary changes, including increased consumption of high fat processed foods (de Mola, Quipse, et al, 2014; Uauy, Albala, & Kain, 2001) as well as an increase in sedentary lifestyles have been linked to the increases in obesity among urban dwelling Peruvians. Wealth is usually a risk factor for obesity and overweight among women and children in middle-income countries, however recent studies indicate that risks for those living in resource poor settings such as San Juan de Miraflores may be equal to those living in wealthier settings (Carillo-Larco, et al, 2016).

Early Intervention for Obesity Prevention

High rates of global obesity among adults, in addition to a rise in prevalence of childhood obesity has drawn attention to the need to prevent obesity amongst the youngest populations. Early intervention is critical, as many obesity preventive behaviors, such as healthy eating and physical activity behavior patterns, are established at this age, and may have lifelong consequences (Barrosa, Roncancio, Hinojosa & Reifsnider, 2012, Trost, et al, 2003). The preschool age development is also the time period immediately preceding a period of adiposity rebound, during which children go through a rapid increase in BMI during preadolescence (Trost, et al, 2015). Additionally, there is an expected decrease in physical activity levels from the preschool age into

middle childhood (DeBock, Genser, Raat, Fischer, & Renz-Polster, 2013) highlighting the need to promote physical activity prior to this known decline.

Obesity is the result of an energy imbalance in children. In order to combat this trend, helping our children to eat healthy and be physically active has recently become a public health priority (Emma & Jarrett, 2010). Interventions at this age can establish healthy habits prior to a particularly risky time during childhood and adolescence (Trost, et al, 2003). Nader and colleagues (2006) found that preschool aged children who were above the 50th percentile for BMI were more likely to be overweight by the age of 12, setting them up for a dangerous life trajectories. The Childhood Obesity Workshop of the National Institute of Child Health and Human Development identified the need for early intervention and called for programs targeting children three to five years of age in prevention efforts (Alexander, et al, 1991). The Centers for Disease Control and Prevention has also called for more information regarding the relationship between physical activity and obesity in preschool aged children (Trost, et al, 2003). These research and early age obesity intervention efforts should be aimed at populations most at risk for childhood obesity (Alexander, et al, 1991). The World Health Organization notes that a dramatic increase in global young childhood obesity since 1990 has led to a critical need for effective interventions during early childhood (de Onis, Blossner, Borghi, 2010).

Parental Factors Influencing Childhood Obesity

One of the primary differences in obesity prevention among adults and young adults and efforts targeting children is the need to involve parents in childhood obesity prevention. Parents have been identified as one of the strongest predictors of obesity and overweight in their children (Trost et al, 2003). Parents serve as role models of nutrition,

physical activity, and sedentary behaviors for their preschool children. Additionally, they largely control opportunities for obesity preventive behaviors like physical activity and healthy eating habits, from which children adopt lifelong habits (Baughcum, et al, 2000). This section of the review describes the influence of parental perceptions, culture, weight status, physical activity levels and diet on preschool child obesity and overweight. Other factors that influence childhood obesity include parental education and employment status (Vasquez, Shaw-Ridley, & Baig, 2016).

Parental Perceptions

Researchers assert that in order to prevent obesity in young children, parents must first perceive their child as being overweight or obese, and recognize obesity in their child as a risk for negative health outcomes (Eckstein, Mikhail, Ariza, Thomson, Millard, & Binns, 2006). Baughcum and colleagues (2000) found that mothers with less education were less able to correctly identify their overweight preschool aged child as being overweight, and argued that mothers with less education may lack awareness of the health consequences associated with childhood obesity. Another study found that parents of overweight children under the age of six were less likely to identify their child as overweight as compared to parents of older overweight children (Eckstein, et al, 2006). In a sample of Hispanic five and six year old children and their families, only forty percent of mothers of overweight children were able to correctly identify their five and six year old children as being overweight or obese. Moreover only 40 percent of the mothers considered their child's weight to be a health risk (Ariza, Chen, Binns, & Christoffel, 2004).

Rich and colleagues studied Dallas area WIC recipients' perceptions of their children's weight. The sample was composed predominantly of Hispanic Latino parents of overweight toddlers and preschool children. Only half of the mother's correctly identified their child as being overweight or obese (Rich, DiMarco, Huettig, Essery, Andersson, & Sanborn, 2005). Eckstein and colleagues (2006) found that only 26 percent of parents of overweight or obese children felt concerned about the associated health risks for their children. This number was even lower in parents of overweight children under the age of six. Hirschler and colleagues studied the relationship between Argentinian parental perceptions of their preschool children's weight and children's actual weight. In their school-based study of 231 Argentinian mothers of overweight children three to five years of age, 76% of mothers described their child as being thin or having normal weight (Hirschler, Gonzalez, Talgham, & Jadzinsky, 2006) and nearly all of these mothers felt their child did not eat in excess.

Parental Culture and Values

Parental values and culture may influence attitudes about obesity as well as obesity preventive behaviors such as physical activity and diet. In addition to ethnicity, which has been identified as a risk factor for overweight and obesity in preschool children (Vasquez et al, 2016), cultural beliefs may influence children's weight. Parental values or preference may influence their child's weight status, as Kramer and colleagues (1983) found that mothers who thought a fatter baby was a healthier baby were more likely to have obese children. Among some cultures, excess weight may actually be seen as healthy. For example, in Brazil excess weight in children is seen as indicators of health and wealth in contrast to the malnutrition and underweight plaguing children living

in poverty (Silveira, Colugnati, Poblacion, & Taddei, 2014). Another study of Brazilian mothers found that thinness among children was associated with lack of health and money, and that a chubby child is a healthy child (Lindsay, Sussner, Greaney, & Peterson, 2009). Additionally, parents' perceptions of their control over their child's eating and physical activity behaviors vary by weight status, with parents of overweight children stating they feel less able to help their child to be more physically active or change their eating habits (Eckstein et al, 2006).

Culture may also influence parental involvement in their children's physical activity. Ethnographic research indicates that culture may affect parental involvement in their preschool children's physical activity play (Emma & Jarrett, 2010). Parents perceived barriers to physical activity may also affect physical activity opportunities for preschool children, and perceived barriers may be a function of socio-cultural differences (Emma & Jarrett, 2010). Lindsay and colleagues (2009) found that Latina mothers reported cultural practices functioned as barriers to promoting physical activity in their preschool children. Additionally cultural factors may influence who is responsible for planning, preparing and serving the food that the family and preschool children will eat. For example in the Lindsay and colleagues study, Brazilian mothers reported during study interviews that the grandmothers were commonly responsible for meal preparation and deciding what the children eat (Lindsay, et al., 2009).

Parental Weight Status

Research indicates that parental obesity is strongly related to obesity in young children. This is particularly concerning in Peru, where more than 60 percent of women aged 20 to 49 years old are overweight or obese (Loret de Mola, et al, 2014). Trost and

colleagues (2003) suggest that overweight parents create home environments that may contribute to childhood obesity. Dubois and Girard (2006) found that children born to mothers with a BMI of 25 or higher were more than twice as likely to be overweight or obese by the age of four and a half years as compared to children born to mothers with BMIs less than 25. Preston and colleagues found that having an obese mother was a risk factor of obesity among seven and eight year old children living in Peru (Preston, Ariana, Penny, Frost, & Plugge, 2015).

Trost and colleagues studied the relationship between physical activity and overweight in a sample of 281 preschool children and their families in Columbia, South Carolina. They found a strong relationship between childhood overweight and parental obesity, and that overweight preschool aged children were three to six times more likely than non overweight children to have at least one obese parent (Trost, et al, 2003). Research indicates that parents' activity and dietary patterns can be used to predict obesity status in children (Eckstein et al, 2006). Barroso and colleagues (2012) studied the relationship between maternal demographics and childhood weight among Mexican-American WIC recipient mothers living in central and south Texas. In their study of 374 one and two year old children and their families, over 80 percent of children whose mothers were overweight or obese were also overweight (Barroso, et al, 2012). Another study by Alexander and colleagues examined the relationship between Mexican-American mother's demographics, nutrition knowledge, feeding practices, values of body image and obesity in their children. Of the 143 preschool aged children and their mothers in the study, researchers found that obese children in the sample were more likely to have obese mothers (Alexander, et al, 1991).

Parental Physical Activity Level

Parents may influence their child's physical activity levels in a number of ways. Parents largely control their children's opportunity for physical activity outside of the school or daycare setting (Baughcum, et al, 2000). One study examining family differences regarding physical activity between 201 Mexican-American and 146 Caucasian families with children attending Head Start preschools in California found that Mexican-American parents had more rules restricting indoor and outdoor play time for their four year old children than Caucasian families (Sallis, Nader, Broyles, Berry, Elder, McKenzie, & Nelson, 1993). The activity level of the parents, or parental modeling of physical activity behaviors is one determinant of physical activity levels in young children (Sallis, et al, 1993). Another study identified that Latina mothers reported their work schedules as a barrier to engaging in physical activity with their children (Lindsay, et al, 2009).

Parental Support for Physical Activity

Another parental influence is the frequency in which the parent directly encourages (or prompts) the child to be active (McKenzie, Sallis, Elder, Berry, Hoy, Nader, Zive, & Broyles, 1997, Sallis, et al, 1993). Sallis and colleagues (1993) found that Mexican American parents tended to prompt their preschool aged children to engage in physical activity less often. Other influences, such as the amount of active toys or sports equipment in the home has also been linked to physical activity levels in children (Trost, et al, 2003, Sallis, et al, 1993). One study conducted by Finn and colleagues (2002) found that preschool children who had fathers with lower BMIs were more physically active during the day. Other studies have also found a relationship between the father's BMI

and the preschool child's activity levels (Vollmer, et al., 2015, Sallis, Patterson, McKenzie & Nader, 1988).

Increasing physical activity and decreasing sedentary activity are important obesity preventive behaviors for preschool children. Recognizing the influence parental factors have on childhood obesity and particularly children's activity levels are important to consider.

Parental Diet

Parenting styles and behaviors are the largest influence of preschool children's eating behaviors (Tatlow-Golden, Hennessy, Dean, and Hollywood, 2014). Parents strongly control and influence the eating behaviors of preschool children. They not only choose the type and amount of food their children eat but they also model eating behaviors for their preschool children (Montano, Smith, Dishion, Shaw, and Wilson, 2014). Characteristics of parents may influence how they eat, and how they feed their children including educational attainment and culture. Parental education status may influence how they feed their children. A national survey of 34,366 mothers and their young children in Brazil found that mothers with low education attainment fed their children more unhealthy foods as compared to mothers with higher educational attainment (Saldiva, Venancio, de Santana, da Silva Castro, Escuder, and Giugliani, 2014). Another study of 172 three to five-year-old children in Ireland found that children had healthier diets in homes where mother's had higher educational attainment (Tatlow-Golden, et al., 2014). The researchers also found that in homes where parents consumed healthier diets, children consumed healthier diets. Vollmer and colleagues studied the associations between parents feeding practices and children's diet and weight status

among 150 low-income fathers and their preschool children living in Connetticut. Vollmer and colleagues found that fathers who consume diets low in nutritional value and high in caloric dense foods are likely to have preschool children with similar diets (Vollmer, et al, 2015).

Parenting styles and feeding practices may also influence children's preference for certain foods. For example, studies have shown that when children are pressured by their parents to eat certain foods they may exhibit distastes of these foods later in life (Lars, Hermans, Sledens, Engels, Fisher & Kremers, 2015, Tatlow-Golden, et al, 2014). Also, higher intakes of unhealthy snack foods are seen in households where parents use food as rewards for good behavior (Larsen, et al, 2015).

Parents largely determine and shape preschool children's diet and physical activity behaviors that young children tend to internalize and incorporate into long-term lifestyle behaviors (Trost et al., 2003). Parental characteristics, from their cultural values, to their physical activity behaviors and dietary preferences are powerful determinants of young children's weight status and obesity preventive behaviors.

Physical Activity in Preschool Children

Decreased physical activity and increased sedentary behaviors are thought to contribute to the growing number of obese children in Latin America (Alhassan, Sirard & Robinson, 2007). While lack of physical activity has been identified as a causal agent in the obesity epidemic, physical activity has also been shown to be protective against rapid weight gain and helpful in maintaining healthy weight (Trost, et al, 2003). Lioret and colleagues (2008) national study of the physical activity and diet behaviors of 748 three

to eleven year old children in France found that more sedentary three and four-year-old children were more likely to be overweight than non-sedentary children.

The National Association for Sports and Physical Education, the Centers for Disease Control and Prevention, and the American Heart Association state that preschool age children two years of age and older should receive 60 minutes of structured activity and 60 or more minutes of unstructured moderate-intensity physical activity daily (Alhassan, et al, 2007, Cruz, Davis, Myers, O'Donald, Sanders, & Sheche, 2016, How Much Physical Activity do Children Need, 2015, The AHAs Recommendation for Physical Activity in Children, 2013). Most preschool aged children are not meeting this guideline (Cruz et al, 2016, Reilly, 2008, Alhassan, et al, 2007) and overweight and obese preschool aged children are receiving even less (Cruz et al, 2016, Trost, et al, 2003). Overweight preschool aged boys participate in less physical activity than normal weight boys, and preschool age girls regardless of weight status participate in low levels of physical activity (Trost, et al, 2003, Finn, et al, 2002, Brown, Googe, McIver, & Rather, 2009). A pre-school based study of 35 three to five year old children attending Head Start Centers in California conducted by Alhassan and colleagues (2007) used accelerometers to measure the physical and sedentary activity of children. Alhassan and colleagues (2007) found Latino preschool aged children to be sedentary 90 percent of the waking hours during the day. Multiple studies found Mexican-American preschool children to be less active than Anglo-American children in both the home and school settings, and this difference in physical activity participation persisted through older childhood (Alhassan, et al, 2007, Sallis et al, 1993, McKenzie et al, 1997, McKenzie et al, 2002, Nader et al, 1995).

The preschool years are a time of significant development of the child's loco motor and object control skills (Williams et al, 2008). Level of motor skill performance may inhibit or facilitate physical activity in preschool children, as older children with poorly developed motor skills have been shown to engage in less physical activity (Williams et al, 2008). Additionally, studies have found that three and four year old children with more developed motor skills spend more time engaged in physical activity (Fisher et al, 2005, Williams et al, 2008). Because motor skill performance in preschool age children has been identified as an important factor contributing to physical activity level, it is important to consider motor skills development, and the encouragement of developmentally appropriate physical activity, in the context of physical activity for the prevention of obesity in preschool children (Williams et al, 2008). The National Association for the Education of Young Children established a set of developmentally appropriate practices (DAP), the Appropriate Practices in Movement Programs for Young Children Ages 3-5, to encourage the implementation of culturally competent and developmentally appropriate physical activity in early childhood education settings (Emma & Jarrett, 2010).

In spite of the fact that Hispanic preschool children participate in less physical activity than their non-Hispanic peers (Sallis et al., 1993) there is a lack of information examining possible ethnic variations in motor skill development levels in the preschool age group. The two studies exploring this topic found minimal and insignificant differences in performance of three movement skills testing balancing, jumping and catching abilities in Latin American and Anglo American four, five and six-year-old

children, despite differential participation in physical activity in the same cohort of children in later childhood (McKenzie et al, 2002).

Diet in Preschool Children

In addition to physical activity, diet is the other component of the energy balance equation in preschool aged children that influences weight status and obesity. Previous studies of the diets of four-to six-year-old children have found that they exceed the recommend caloric intake and are high in caloric dense food and added sugars (Kostecka, 2014). One facet of the nutrition transition occurring in Latin American countries is the increased access to food, particularly inexpensive high caloric food found in fast food restaurants including sugar-sweetened beverages. Latin America is among the world's leading consumers of sugar-sweetened beverages, with Peru's southern neighbor, Chile, accounting for the highest growth in sales of sugar sweetened beverages in the world (Popkin, et al., 2016). In Silveira and colleagues 2014 national study of 2421 Brazilian preschoolers, they found that 40 percent of preschoolers consumed sugar sweetened beverages at least four days per week, and nearly a quarter of all preschoolers consumed sugar sweetened beverages every day (Silveria, et al., 2014).

There are no published studies evaluating the eating habits of preschool children in Peru. However, one study of older children ages seven to eleven years in Lima, found that 100 percent of parents reported that their children drank soda on a weekly basis and more than half of parents reported their children drank soda multiple times per week (Busse & Diaz, 2014). The study also found that parents reported their children to frequently engage in snacking behaviors, with common snack foods including chocolate, candy, gum, hot dogs, salty snacks and cookies.

Interventions with Preschool Children

In response to rising rates of childhood obesity, interventions aimed at reducing and preventing obesity have been implemented in various settings globally. Interventions aimed at increasing physical activity in the preschool aged population have used various methods to achieve the desired objective, but with limited success (De Bock et al., 2013). Few have achieved any significant changes in the children's BMI (Barkin, Gessell, Po'e, Escarfuller, & Tempesti, 2012). Some reasons for lack of success among the few interventions aimed at this age group may include lack of parental involvement and consideration of environmental influences (Barkin et al., 2012).

In 2013 Bellows and colleagues implemented an intervention, "The Food Friends: Get Movin' With Mighty Moves", in conjunction with a nutrition based program, with the aim of increasing physical activity in 201 predominantly Hispanic children three to five years of age attending Head Start Programs. The program aimed to increase physical activity levels by increasing the children's motor skill levels. Prior to the intervention, Bellows and colleagues found that those children with less developed motor skills engaged in significantly less physical activity (Bellows et al., 2007; McKenzie et al., 2002). The program included the teaching and practice of a new motor skill each week. The Mighty Moves program was conducted four days a week for 18 weeks. Although the Mighty Moves program was successful in increasing the children's motor skill levels, the intervention proved not to be successful in increasing any of the children's physical activity levels or decreasing BMI in overweight children (Bellows, et al., 2013).

One successful intervention that increased young children's physical activity levels in the preschool setting was the "Eine Meine Fit" program implemented in

preschools in southern Germany (De Bock, et al, 2013). The program recognized the influence that parents have in preschool children's physical activity levels, and incorporated that influence into the program by adding after-school portion. The Eine Meine Fit program was a school and community based intervention that incorporated parental and preschool community influence into the intervention, and required parents to engage in physical activity with the children at home and in group settings after school and on weekends (De Bock, et al, 2013).

The nutrition and physical activity based obesity prevention program, Salud con la Familia, was unique in that it was not based in the school setting, but in a community based setting, and focused on 92 Hispanic parent child dyads (Barkin et al., 2012). Participants were predominantly Mexican-American, and the majority of parents (84 percent) and 40 percent of preschool children were overweight or obese at study commencement. Participants attended weekly 90 minute sessions in which they learned and practiced new skills relating to nutrition and physical activity. Barkin and colleagues (2012) found their culturally tailored community-based intervention aimed at educating parents and children about ways to eat healthy, increase physical activity and decrease sedentary activities had the greatest effect in reducing BMI in those children who had the highest BMIs, but small sample size limited statistical analyses of significant differences.

Alhassan and colleagues 2007 study incorporated the recognition of outdoor playtime as an important component of physical activity for preschoolers in their intervention with Latino children attending a Head Start center in California. Researchers attempted to increase physical activity in the preschool children by increasing the amount of allotted outdoor playtime during the school day from 60 minutes to two hours. The

intervention found that the children receiving the additional recess time did not engage in significantly more physical activity than the control group, but small sample size and short intervention duration may have limited findings (Alhassan et al., 2007).

Lastly, a pilot study conducted in Santiago, Chile with four and five-year-old children in preschool settings aimed at increasing physical activity behaviors and modifying eating behaviors. The intervention was grounded in the Social Cognitive Theory. It was a school-based program that involved regular participation of the parents. The small pilot study which included two experimental schools and two control schools was able to produce most decreases in the intake of fatty foods among obese children and most increases in participation in moderate to vigorous physical activity among obese and overweight preschool children (Salazar, Vasquez, Concha, Rodriguez, Berlanga, Rojas, Munoz, and Andrade, 2014).

Interventions have been wide spread and conducted globally in various settings. While most interventions have been school based, a few have utilized community or home settings. Success has been limited. Many interventions have failed to produce substantial behavior changes or changes in body fat or body mass index. Interventions deemed to be successful have produced small or moderate increases in positive behaviors like physical activity and moderate decreases in unhealthy dietary behaviors. Interventions that have incorporated the participation of the parents have been the most successful.

Summary of Literature Review

The childhood obesity epidemic is currently one of the most important global public health issues, including in low and middle-income countries in Latin America

(Gonzalez-Casanova, Sarmiento, Pratt, Gazamariaian, Martorell, Cunningham, & Stein, 2014). This review first presented literature describing how the prevalence of overweight and obesity in children has grown drastically over the past several decades and is high even among young children. While obesity and overweight are two of the leading causes of preventable morbidity and mortality in Latin America, prevalence remains high, even amongst the youngest members of the population (Busse & Diaz, 2013). The review then presented literature which demonstrated that the public health community has identified the need for prevention programs aimed at the preschool population in order to combat obesity early in life (Emma & Jarrett, 2010).

Various factors determine the high rates of obesity and overweight in young children, and many of them relate to parental influences and the family environment (Baughcum, et al., 2000). The review then presented literature on the scope of parental influences on childhood weight status. Parental influence is known to be a strong predictor of physical activity and nutrition behaviors, one of the most important ways of maintaining energy balance and controlling weight in childhood. Physical activity and nutrition are protective against excessive weight gain in childhood (Trost, et al., 2003) and parental factors are known to influence these behaviors in preschool children. These parental influences, however, may vary among racial and ethnic groups (Emma & Jarrett, 2010). Further research is needed to understand cultural variations in parental influences, and how these influences in Peruvian parents may contribute physical activity and nutrition behaviors in the preschool population.

CHAPTER III

METHODS

This chapter describes the methods used to conduct the study. The chapter begins by describing the setting in which the study takes place and population comprising the study sample including the criteria used to include or exclude participants for the study. Second, the procedures for the study including the pilot testing, recruitment, training and data collection are described in detail. The chapter concludes by describing the methods used to analyze each of the research questions.

Setting and Sample

The cross-sectional survey study was conducted with 200 parents recruited from five public and private preschool sites in the San Juan de Miraflores, Lurin, and Villa Maria del Triunfo neighborhoods of southern Lima, Peru (*Lima Sur).*

Neighborhood and Family Characteristics in Lima Sur

The study was conducted in the communities of southern Lima (Lima Sur) including San Juan de Miraflores, Villa Maria del Triunfo and Lurin. San Juan de Miraflores (SJM) and Villa Maria are the largest communities within Lima Sur, with populations each over 330,000 (Weygandt, Cardenas, Gilman, Avila-Tang, Cabrera, and Checkly, 2012, Nuestro Distrito, San Juan de Miraflores, 2016). These communities are on the south-eastern border of the Lima metropolitan area. SJM, along with Villa Maria and Lurin are *pueblo nuevos*, or shanty-town, that were first established in the 1950s and became more populated during the 1980's when many Peruvians living in the mountains

and jungles outside of Lima moved into the city for economic opportunity and as refuge from the terrorism threat to the rural parts of the country (Weygandt, et al., 2012, Nuestro Distrito, San Juan de Miraflores, 2016).

Being a *pueblo nuevo*, life in Lima Sur can be less modern as compared to other neighborhoods in Lima. Many of the homes and buildings in the community are under a continual state of construction, as residents build their homes room by room as they can afford. For the most part, homes in the neighborhood have electricity, but some homes, particularly the homes built into the steep hillsides overlooking Lima, have struggled to maintain running water and plumbing systems due to lack of infrastructure. However, thanks to recent government efforts most homes now have indoor plumbing (Nuestro Distrito, San Juan de Miraflores, 2016). Homes rarely have lawns and often sit adjacent to the heavily trafficked streets, leading to traffic incidents being the number one cause of injury to children in the neighborhood (Donroe, Gilman, Brugge, Mwamburi, & Moore, 2009).

The residents of Lima Sur generally have lower levels of education and work in service and retail work. Most homes in the district have a monthly income around the national minimum wage, which is about $ 750 USD per month. Family size is small, generally with 2 kids per family, and about 20 percent of the adults in the neighborhood are stay at home parents (Donroe, et al., 2009).

School Setting

By law in Peru, all children are required to be enrolled in a preschool center by the age of two (Principios de la Educacion Incial, 2016). Preschools in Peru vary in structure. Many of the preschools function as full-day day care services and while others

offer more traditional pre-school morning session educational programs in line with the seven principles for early education outlined by the Ministry of Education (Principios de la Educacion Incial, 2016).

The Peruvian Ministry of Education regulates and licenses all public and many private schools in Peru, including preschools. The Ministry divides the regulations of all schools into smaller by geographic locations. These regional divisions within the Ministry are called Unidad de Gestion Educativa (Educational Management Units), or UGEL regions. All preschools in Lima Sur are governed by UGEL Region 1. Lima Sur has a large number of preschool centers including over 300 unlicensed private preschools, 50 UGEL licensed private preschool centers and 30 UGEL licensed public schools. The study was conducted at 5 of the UGEL licensed private and public preschool sites. The school sites are schools currently working with the PRISMA organization to promote healthy lunch initiatives.

Sample

The sample was comprised of 200 parents of three-and four-year old children attending preschool in the Lima Sur neighborhoods. The sample was recruited as a convenience sample of parents recruited from five preschool sites. G* Power analysis was used to calculate necessary sample size to achieve adequate power, indicating a sample of 143 parents were necessary. A sample of 200 parents, utilizing a medium effect size, yielded a study power of 0.92.

Inclusion criteria. To be included in the study parents had to meet the following criteria:

(1) Have a child three-or four-years of age

2) Child was enrolled at a school in San Juan de Miraflores, Lurin, or Villa Maria.

3) Be able to read and write in Spanish or English

4) Be the primary caregiver for their child

Exclusion criteria. Exclusion criteria included:

1) A spouse or partner completed the survey

2) Child was not enrolled in participating preschools

3) Parent was unable to read and write in Spanish or English

4) Parent was not the primary caregiver for their child

Instrumentation

Two instruments were used to collect data for the study. The first instrument is a modified version of a previously utilized survey with parents of preschool children, see Appendix 2. The second instrument is a researcher-developed instrument to collect child health metrics.

BAQ-HH

The first survey instrument is a modified version of the Behavior and Attitudes Questionnaire for Healthy Habits (BAQ-HH), an interview questionnaire that has been previously utilized and validated in a population of Latino parents of preschoolers. The instrument was utilized to assess scores across three dimensions; knowledge, attitudes, and behaviors related to nutrition and physical activity behaviors (Henry, Smith, & Ahmad, 2014). The instrument has been tested and validated in both the English and Spanish versions. Internal consistency and reliability measures ranged from Crohnbach alphas values 0.86 to 0.91 across the three dimensions. Items in the questionnaire are scored on a six point rating scale (ie. strongly disagree to strongly agree).

The instrument includes seven items addressing knowledge, four assessing attitudes and nine questions addressing behaviors, in addition to demographic questions; two open-ended questions regarding parental perceived barriers to overweight and obesity prevention were also included. Scoring for the knowledge, attitude and behaviors scales are computed by summing the item scores for each scale. The total score for each scale is scored as the mean of the item scores on a 6-point scale, with higher scores indicating positive associations for knowledge and behaviors. Higher scores for attitudes indicates a greater level of concern and is considered to be a negative response. In addition to the three sub scales, the instrument includes five questions from Rao's "Big Five" common childhood behaviors associated with childhood obesity, which indicates the frequency of particular behaviors occurring in the home environment (Rao, 2008, Henry et al, 2013).

Two questions assessing parental ability to correctly qualify their child's weight status were added to the BAQ-HH using visual and verbal descriptors. Although these questions were not included in the original BAQ-HH survey, they have been utilized and were extracted from other studies assessing parents' ability to correctly assess their child's weight status. The first included question uses visual images and asks parents to identify the image of the child which they feel most closely resembles their child's weight status and has been utilized in previous research by (Eckstein et al., 2006). It includes a series of pictures of both male and female preschool aged children of varying weight statuses. The second question uses verbal descriptors and asks parents to describe their child's weight status as being: very underweight, slightly underweight, about the right weight, slightly overweight, or very overweight. This question has been utilized in

numerous studies assessing parental ability to correctly identify their child's weight status and avoids stigmatizing terminology such as "obese" (Baughcum et al, 2000, Eckstein et al., 2006, Gauthier & Gance-Cleveland, 2016).

In addition to the two questions assessing parental perception of child weight status, three additional questions identifying the type of information parents are currently receiving about overweight and obesity prevention have been added. These questions do not directly address the study research questions but may provide useful insights to explain study findings and inform future obesity and overweight interventions. The questions seek to identify potential resources and education efforts within the community. These questions ask parents to identify whether they are currently receiving any information about healthy eating and physical activity for their children and families, and if so, what is the source of the information, and do they find it helpful. Completion of the survey averages 15 minutes. Each survey will have a numerical code corresponding with a Child Health Record.

Child Health Record

The second instrument was the researcher developed Child Health Record, which was used by school staff members to collect the children's BMI data (Appendix 3). Data collected from this form was used to answer research question three, what proportion of parents are able to accurately assess their child's weight status? The form was used to extract information from school health records to collect data on the age, gender, height, weight, and date of the medical exam for children of participating parents (see Appendices).

Procedures

The study was approved first by a human ethics committee of A.B. PRISMA (Lima, Peru) and then by the I.R.B. of Florida International University (Miami, Florida). A Spanish-speaking research assistant originally from the Lima Sur neighborhood was trained by the PRISMA organization and assisted with all school staff and parent communication.

Human Subjects Considerations

The study plan was presented to a human ethics committee from A.B. PRIMSA, an NGO research organization based in Lima, Peru, in May of 2016 and granted approval after full-review in August of 2016, see Appendix 4. Following approval in Peru, the study was presented to the Institutional Review Board at Florida International University in Miami, Florida, and received approval through expedited review in October of 2016, IRB Protocol Number IRB-16-0390, see Appendix 5.

Pilot Testing

Prior to initiating the study in Lima Sur, the study instrument (BAQ-HH) was pilot tested for appropriateness of language and comprehension among parents of Peruvian preschool children. Although the instrument has been previously utilized and validated among low-income Spanish speaking parents, it had never been used with low-income Peruvians. To avoid potential bias late in the study, parents outside of the San Juan, Lurin, and Villa Maria neighborhoods participated in the pilot test. Three mothers of three and four year old children living in Villa San Salvador were recruited using convenience sample for participation in the pilot test. Villa San Salvador borders San Juan de Miraflores to the east, and is another low-income *pueblo nuevo* neighborhood in

Lima with similar socio-demographic characteristics to the other neighborhoods of Lima Sur. Parents participating in the pilot test were asked to complete the survey, report the time it took to complete, and identify any items or answer choices in which the language or meaning of the question was unclear or culturally inappropriate. Minor necessary language and question modifications based on the pilot test were made to the instrument. Edits included the clarification of the answer choices for the question regarding parental education attainment and changing the words used to describe a soda from "*refresco*" to "*gaseosa*". Pilot test participants reported an average of seven minutes for completion time.

Recruitment and Training

Following the pilot test, the study commenced. The researcher wrote a letter of introduction to the Peruvian Ministry of Education Director at UGEL Region 1 residing over preschool education in the Lima Sur neighborhoods. This letter requested permission to conduct the study, see Appendix 6. During the first week of November 2016, a meeting with the researcher, UGEL director and PRIMSA staff was held in which the UGEL director granted final approval to conduct the study, see Appendix 7. A list of Lima Sur preschool sites and school directors' contact information was provided to the researcher by PRISMA staff. Directors of preschools in San Juan de Miraflores, Villa Maria and Lurin were identified and contacted via school site visit by the researcher and research assistant with information about the study and invitation to participate. Six total school sites were contacted. Five consented and one school director was unavailable to meet with researchers. Study trainings were scheduled for the end of the first week and

the beginning of the second week of November, 2016 with the five preschools, three private and two public that consented to participate in the study.

The researcher and research assistant visited each of the participating preschool sites a second time during the first two weeks of November, 2016. At this time researchers delivered the study materials including the parent recruitment letters, recruitment posters, see Appendices 9 and 10, and consent forms to the schools. During the meetings with school directors, dates for data collection were scheduled. Data collection periods were scheduled for before school and after school hours, during the time when parents pick-up and drop off their children. Two data collections were scheduled for each school in order to capture both morning and afternoon students. A few additional data collection times were scheduled for select school special events where parents would be in attendance and parent teacher meetings based on individual schools' requests. Dates for sending home parent letters and consent forms were also scheduled at this time. Parent invitation letters and consent forms were sent home with children one week prior to the scheduled data collection periods.

School directors also identified the school staff member responsible for completing the Child Health Record. Research staff reviewed the Child Health Record form with assigned school staff member in order to explain the process for filling out the form and answer any questions about how to complete it.

Data Collection

On the assigned dates for distribution of parent invitation letters and consent forms researchers visited school sites to assist with any issues and confirm distribution of study documents to the parents. Teachers of three and four year old classes sent each

student home with parent invitation letters and consent forms. Signed consent forms were returned to the classroom with the students following distribution during the week prior to data collection.

During assigned data collection periods the researcher and research assistant were on site at each school. Schools provided researchers with completed consent forms. Consenting parents completed the survey during pick-up and drop off times and at select parent teacher meetings. Parents who had not completed the consent form were invited for participation, and those who were interested were consented at that time. The researcher gave participating parents both the survey and the Child Health Record form. As the parent completed the survey they were directed to write only their child's name on corresponding Child Health Record forms and leave all other spaces on the form blank. Parents placed each completed survey in a sealed envelope. The completed surveys and Child Health Record forms with the student's names were collected by the researcher. The school directors and teachers had no access to review parental responses on the survey. The corresponding Child Health Record forms for each child of participating parents were delivered to the staff member responsible for completing the Child Health Record form.

Once all parent survey data collection was completed at the school, the staff member then completed the Child Health Records using school medical records. The school staff member who completed the Child Health Record covered the child's name using a black sharpie maker provided by the researcher prior to the researcher collecting the data forms. Once the school staff member completed all of the Child Health Record forms they contacted the researcher and to notified the researcher to come to the school

site to collect them. Researchers then visited the schools again during the third week of November to collect the completed Child Health Records. Data from the completed surveys and Child Health Records were entered into a password-protected laptop and stored in the SPSS V21 (IBM, 2015) software program on the laptop. All data was encrypted and saved on a password protected external hard drive as well.

Treatment of the Data

Data Storage

Completed data forms were kept in a secure location to protect confidentiality of all participants. The statistical software package IBM Statistical Package for the Social Sciences, SPSS, V21 (IBM, 2015) was used for data storage and analysis on a password protected computer.

Data Analysis

Data from completed questionnaires was analyzed in order to establish Peruvian parent's perceptions across three dimensions about nutrition and physical activity and their role in maintaining the health through the prevention of obesity in their children. Descriptive statistics were utilized to answer Research Questions 1 and 3. Inferential statistics were used to analyze data to answer Research Questions 2 and 4.

BMI Measures. Children's BMIs were calculated using the standard equation for BMI with metric measurements for children over two years of age. Calculated children's BMIs were used to classify the child's weight status prior to data analysis. Weight status was categorized into one of the following options: severely wasting, wasting, healthy weight, possible risk of being overweight, overweight and obese, based on WHO standard classifications for children under five. WHO defines severely wasted as a BMI

of <-3 Z Scores below average BMI for age, wasted as ≥-3 and <-2 Z Scores, healthy weight as ≥-2 and ≤1, possible risk for being overweight >1 Z-Score and ≤2 Z-Scores, overweight >2 and ≤3 Z-Scores, and obese as >3 Z-Scores above average BMI for age (World Health Organization, 2008).

Research Question 1. What are Peruvian parents' knowledge, attitudes, and behaviors about home-based nutrition and physical activity for their preschool-aged children?

Simple descriptive statistics were utilized to calculate parental scores for the three scales including means and standard deviations. To evaluate Peruvian parents' knowledge about nutrition and physical activity for their preschool aged children, the knowledge scale was summed, with higher sums indicating knowledge and lower sums indicating gaps in knowledge. To evaluate Peruvian parents' attitudes about nutrition and physical activity for their preschool aged children, attitude scales were summed, with higher scores indicating healthier attitudes. To evaluate Peruvian parents' attitudes about nutrition and physical activity for their preschool aged children, attitudes scale were summed, with higher scores indicating more concerned, or less healthy attitudes. Lower scores on the knowledge and behaviors scale indicated areas of unhealthy knowledge and behaviors among respondents. Parental demographic characteristics including their gender, age, and education level were analyzed using simple descriptive statistics. Inferential statistics including independent samples t-test and ANOVA were used to assess any differences in scores on parental knowledge, attitudes and behaviors scales by parental demographic characteristics. Additionally, demographic characteristics of the children of parent participants were calculated including their gender, age, BMI measure,

weight status, and type of school they attend (private versus public). Further demographic characteristics of the children in the sample were described including their physical activity and nutrition behaviors. Specifically, the frequency of unhealthy and healthy behaviors occurring in the home on a weekly basis were evaluated using simple descriptive statistical analysis of the five questions from Rao's "Big Five" scale.

Research Question 2. What is the relationship between Peruvian preschool parents' nutrition and physical activity knowledge and attitudes with their nutrition and physical activity behavior?

To answer research question 2 inferential statistics were conducted. To assess any possible relationship between nutrition and physical activity knowledge and nutrition, the independent variable, and physical activity behaviors, the dependent variable, Pearson product-moment correlations were conducted. Similarly, to assess any possible relationship between nutrition and physical activity attitudes (IV) and nutrition and physical activity behaviors (DV) Pearson correlations were done. To assess if either knowledge or attitudes predicted parents' behaviors, linear regression analysis was employed. Finally, to assess if both knowledge and attitudes predicted behaviors, multiple regression analysis was used.

Research Question 3. What proportion of Peruvian preschool parents' accurately assessed their child's weight status?

Parents were asked to describe their child's weight using two questions on the instrument. The first questions asked them to identify the child's weight using images of children of varying weights. The second questions asked parents to describe their child's weight using verbal descriptions. Research question 3 compared the responses of these

two questions to the classification of measured child BMI-for-age according to WHO definitions. In order to compare both parent's verbal descriptions and image selection to the WHO categories, the response choices for the three questions were recoded by collapsing them into four corresponding categories: underweight, healthy weight, overweight, and obese. Recoding of the responses from the three original questions was done according to previously established standards in the literature. The WHO definition of "at risk of being overweight" was collapsed into the "overweight" category, as done previously in the literature.

Next, additional variables were created to measure agreement between parent response and actual weight status. The first variable assessed the agreement between parental responses using verbal descriptors and measured weight status, categorizing agreement between parental response and actual weight as "yes" or "no". The second assessed agreement between parental responses using images and measured weight status. One last variable was created that classified parent's ability to identify child's weight status into three categories including: underestimating their child's weight, correctly identifying their child's weight, and overestimating their child's weight.

Based on these newly created variables, simple descriptive statistics, including frequencies, was utilized to evaluate the proportion of agreement between Peruvian parents' responses of children's weight status and actual child BMI data. A McNemar's test was utilized to detect if there were any differences in parent's ability to identify their child's weight status if they were using either verbal descriptors or images. Finally, descriptive statistics and Fisher's Exact tests were used to present parental responses to child's weight status versus the child's actual weight and assess if the parent's ability to

correctly identify their child's weight status differed by the child's actual measured weight.

Research Question 4. What is the relationship between Peruvian preschool parents' characteristics and their ability to correctly evaluate their child's weight status?

Research question 4 was assessed using inferential statistics. Chi-square analysis was used to test for any differences in parental demographic characteristics variables (gender, age, education level, receiving info) and the outcome variable, their ability to correctly identify their child's weight status using both verbal descriptors and images. Finally Spearman's rank-order correlations were used to assess any differences in parental scores on BAQ-HH scales of knowledge, attitude, and behavior (IV) and parental ability to correctly identify their child's weight using both verbal descriptors and images (DV).

CHAPTER IV

RESULTS

This following chapter presents the results of the study. It is organized into five sections. First, the demographic characteristics of the parents and children in the sample are described. Second, the major results and hypotheses for each of the four research questions are presented. The chapter will conclude with a brief summary of the results.

The purpose of this study was twofold. The first aim was to assess Peruvian parents' knowledge, attitudes, and behaviors regarding home-based nutrition and physical activity for their preschool aged children; and secondly the sought to determine if there is a relationship between nutrition and physical activity knowledge, attitudes, and behaviors of the parents. The outcomes investigated were parental nutrition and physical activity knowledge, attitudes and behaviors, children's nutrition and physical activity behaviors, children's BMI, and parental ability to identify their child's weight status.

Demographics Characteristics of the Sample

Descriptive statistics, including frequencies, percentages, means, standard deviations and range were used to describe the demographic characteristics of participating parents and their children.

Parent Demographics

A total of 204 parents completed the survey. Frequency and percentile of three demographic variables including gender, age, and highest level of completed education are included in Table 3 below. The majority of participants (97%) reported that they were the primary care-giver for their child. When asked who was primarily responsible for

preparing meals, 74% of participants indicated that they were, 9.4% responded their spouse was, and an additional 8.9% indicated a grandparent was responsible.

Table 4

Socio-demographic Characteristics of Parent Respondents.

Variable	n (%)
Gender	
Female	179 (88.6)
Male	23 (11.4)
Age	
Less than 20	3 (1.5)
20 to 29 years	80 (39.8)
30 to 39 years	91 (45.3)
40 to 49 years	22 (10.9)
50 to 59 years	2 (1.0)
60 or more	3 (1.5)
Education	
Grade School	10 (5.0)
High School	78 (39.5)
Technical School	81 (41.1)
Some University	11 (5.5)
University	12 (6.1)
Graduate School	5 (2.5)

Table 5 presents the number of participants who were receiving information about physical activity and/or nutrition for their family at the time of the study. The majority, 139 of 200 total respondents, were not receiving information about physical activity or nutrition for their family. Of those who were receiving information, publically funded sources including government health clinics and public nutritionists accounted for the most frequently cited source of information (25.7%). All cited information sources, and whether or not participants felt the information helped them to make healthy decisions for their family is included in the table as well.

Table 5

Sources of Nutrition and Physical Activity Information Received by Parents

Variable	n (%)
Receiving Information	
Yes	61 (30.5)
No	139 (69.5)
Source of Information	
Government Health Center	26 (18.6)
Public Nutritionist	10 (7.1)
Private Nutritionist	2 (1.4)
Pediatrician	6 (4.3)
Radio Program	5 (3.6)
Internet	8 (5.7)
Magazine	4 (2.8)
School	10 (7.1)
Television	8 (5.7)
Other	7 (5.0)
Information is helpful	
Yes	55 (94.8)
Maybe/Unsure	3 (5.2)

Child Demographics

Child demographic data was available from the schools for 155 of the children of parents who completed the survey study. Eight children were excluded from analysis because they exceeded the age requirement outlined in the study inclusion criteria. A total of 147 children were included in the analysis. Table 6 presents the demographic characteristics of the children of participants. The children's age, gender, BMI measures, weight classification according to WHO standards, and type of school they were attending (public or private) is included in the table below.

Table 6

Socio-demographic Characteristics of Children in the Sample

Variable	n(%)
Age (months)	Mean= 49.4, SD= 8.5
Gender	
Female	79 (53.7)
Male	68 (46.3)
BMI	Mean=16.7, SD=1.9
Weight Status	
Wasted	2 (1.4)
Healthy	83 (57.2)
Possible risk of overweight	36 (24.8)
Overweight	17 (11.7)
Obese	7 (4.8)
School Type	
Public	101 (49.8)
Private	102 (50.2)

The frequency of children's dietary behaviors are presented in Table 7. Dietary behaviors presented include the number of sugary beverages consumed daily, the number of fast food meals consumed weekly, the number of meals the child eats at home daily, and the frequency that the parent eats dinner with the child. Fast food consumption was limited, more than half of children in the sample ate one or no fast food meals per week. Conversely, sugary beverage consumption among children was high with 79.6% consuming two or more sugary beverages daily. Children's physical activity and inactivity behaviors are presented in Table 8 below. Children in the sample were inactive, only 12.6 percent participated in the recommended amount of physical activity, and 39.8% of children spent more than two hours watching tv or playing on the computer each day.

Table 7

Frequency of Children's Dietary Behaviors

Variable	n (%)
Sugary beverages (per day)	
One or less	40 (20.4)
Two	66 (33.7)
Three	50 (25.5)
Four	16 (8.2)
Five or more	24 (12.2)
Fast food meals (per week)	
One or less	134 (68.7)
Two	45 (23.1)
Three	13 (6.7)
Four	2 (1.0)
Five or more	1 (0.5)
Meals at home (daily)	
One	6 (3.1)
Two	40 (20.5)
Three or more	149 (76.4)
Dinner with parents (weekly)	
One or none	16 (8.2)
Two or three times	39 (20.0)
Four or five times	37 (19.0)
Every day	102 (52.8)

Table 8

Frequency of Children's Physical Activity and Inactivity Behaviors

	n (%)
Days of Physical Activity	
Zero or one	48 (24.2)
Two or three	96 (48.5)
Four or five	28 (14.1)
Six or seven	25 (12.6)
Screen time (hours daily)	
Less than one	46 (23.5)
One or two	72 (36.7)
Two or three	49 (25.0)
Three or four	19 (9.7)
More than four	10 (5.1)

.

Research Question 1

What are Peruvian parents' knowledge, attitudes, and behaviors about home-based nutrition and physical activity for their preschool-aged children?

Data for research question 1 was analyzed using descriptive and inferential statistics including means, standard deviations, independent t-tests, and analysis of variance (ANOVA). The mean for the score on the knowledge scale was 5.14 (range=4.14, *SD*=0.70, *n*=188). The mean for the score on the attitude scale was 4.07 (range=5.0, *SD*=1.12, *n*=182). The mean score for the behavior scale was 5.09 (range=3.56, *SD*= 0.56, *n*=184).

Table 9 presents the mean and SD for scores on the attitude, knowledge and behavior scales by the parental demographic characteristics of age and whether or not they were receiving physical activity and/or nutrition information.

Table 9

Mean Scores for Attitude, Knowledge and Behavior Scales According to Parent Socio-Demographic Characteristics

BAQ-HH Scale	Gender	n	*M*	*SD*	Receiving Information	n	*M*	*SD*
Attitudes	Female	160	4.01	1.15	Yes	56	4.11	0.77
	Male	22	4.00	0.94	No	125	4.07	0.62
Knowledge	Female	165	5.18	0.90	Yes	59	5.16	0.77
	Male	22	4.89	0.65	No	127	5.17	0.62
Parent Behaviors	Female	162	5.09	0.57	Yes	60	5.21	0.51
	Male	22	5.11	0.47	No	123	5.03	0.58

To test if there were differences in the knowledge, attitudes and behaviors scales by parental demographic characteristics independent sample t-tests and analysis of variance (ANOVA) were conducted.

Knowledge Scale Scores

An independent sample t-test was performed to compare differences in scores on the knowledge scale by gender. There was no difference $t(185)=-1.84$ $p=0.066$ in knowledge scores between female participants ($M= 5.20$, $SD=0.66$) and male participants ($M= 4.89$, $SD= 0.90$). To compare differences in knowledge scales scores by whether or not parents were receiving information an independent sample t-test was done and indicated no differences in knowledge scale scores $t(184)=-0.030$, $p=0.976$.

A one way ANOVA was done to determine if there were any differences in scores on the knowledge scale by parent's education. Parents' education was divided into six groups: grade school ($n=8$), high school ($n=72$), technical school ($n=75$), some university ($n=11$), university ($n=12$), and graduate school ($n=5$). There was an increase in

knowledge scores from some university (M=4.80, SD=0.49) to high school (M=5.02, SD=0.76) to grade school (M=5.14, SD=0.57) to university (M=5.29, SD=0.51) to technical school (M=5.29, SD=0.67) to graduate school (M=5.54, SD=0.51), but the differences were not significant, $F(5, 177)=2.152$, p=0.061.

To test for differences in scores on the knowledge scale by parents age a one way analysis of variance (ANOVA) tests were conducted. Parental age was classified into six groups: less than 20 years (n=3), 20 to 29 years (n=73), 30 to 39 years (n=84), 40 to 49 years (n=22), 50 to 59 years (n=2) and 60 years or more (n=2). Knowledge scores increased from 40 to 49 years (M=4.98, SD=0.64) to 20 to 29 years (M=5.06, SD=0.83) to 50 to 59 years (M=5.14,SD=0.20) to 30 to 39 years (M=5.26, SD=0.53) to less than 20 years (M=5.42, SD=0.52) to 60 years or more (M=5.50, SD=0.71), but were not significantly different $F(5,180)=1.095$, p=0.365.

Attitude Scale Scores

An independent sample t-test was done to test for differences in in scores on the attitudes scales by gender. There was no difference, $t(180)=-0.322$, p=0.748, in the scores on the attitude scales between female (M=4.01 SD=1.15) participants and male participants (M=4.00, SD=0.94). An independent samples t-test indicated there were no differences in attitudes scale scores, $t(179)=0.297$, p=0.767, by participants who were receiving information about physical activity and/or nutrition (M=4.11, SD=1.09)and those participants who weren't (M=4.06 SD=1.14).

Differences in scores on the attitude scales by parent education were tested for using a one-way ANOVA. Attitude scores increased from some university (n=11, M= 3.97, SD=0.88) to high school (n=67, M=3.99, SD=1.17) to university (n=11, M=4.06,

SD=1.24) to technical school (*n*=77, *M*=4.08, *SD*=1.12) to grade school (*n*=8, *M*=4.62, *SD*=1.04) to graduate school (*n*=5, *M*=4.85, *SD*=1.05). There were no significant differences in scores on the attitude scale by parent education $F(5,173)=0.932$, $p=0.462$.

A one-way ANOVA test was done to compare parental attitude scores by age. Table To test for differences in scores on the attitude scale by parents' age a one-way ANOVA was done. Differences in attitude scores were by parents age were significant, $F(5,175)= 2.469$, $p=0.034$. A Tukey-Kramer post hoc test was run to examine differences in attitude scores between age groups, however it failed to reveal any significant between group differences. The results are presented in Table 10 below.

Table 10

Tukey-Kramer Post Hoc Analysis for Attitude Score Differences by Parental Age

Parent Age	Mean Difference	*SE*	*p*	95% CI
Less than 20 years				
20 to 29 years	1.133	0.653	0.329	[-0.555, 3.207]
30 to 39 years	1.061	0.651	0.580	[-0.815, 2.937]
40 to 49 years	0.548	0.688	0.968	[-1.435, 2.531]
50 to 59 years	0.167	1.011	1.000	[-2.747, 3.081]
60 or more	1.417	1.011	0.726	[-1.497, 4.331]
20 to 29 years				
Less than 20 years	-1.326	0.633	0.329	[-3.207, 0.555]
30 to 39 years	-0.265	0.178	0.674	[-0.779, 0.249]
40 to 49 years	-0.778	0.286	0.076	[-1.602, 0.045]
50 to 59 years	-1.159	0.794	0.690	[-3.448, 1.129]
60 or more	0.090	0.794	1.000	[-2.198, 2.379]
30 to 39 years				
Less than 20 years	-1.060	0.651	0.580	[-2.937, 0.815]
20 to 29 years	0.265	0.178	0.674	[-0.249, 0.779]
40 to 49 years	-0.515	0.282	0.455	[-1.325, 0.299]
50 to 59 years	-0.895	0.793	0.869	[-3.179, 1.399]
60 or more	0.355	0.793	0.998	[-1.929, 2.639]
40 to 49 years				
Less than 20 years	-0.548	0.688	0.968	[-2.531, 1.455]
20 to 29 years	0.778	0.286	0.076	[-0.045, 1.602]
30 to 39 years	0.513	0.282	0.455	[-0.299, 1.325]
50 to 59 years	-0.382	0.824	0.997	[-2.755, 1.992]
60 or more	0.868	0.824	0.898	[-1.505, 3.242]
50 to 59 years				
Less than 20 years	-0.167	1.011	1.000	[-3.081, 2.747]
20 to 29 years	1.159	0.794	0.690	[-1.129, 3.448]
30 to 39 years	0.895	0.792	0.869	[-1.389, 3.179]
40 to 49 years	0.382	0.824	0.997	[-1.992, 2.755]
60 or more	1.250	1.108	0.869	[-1.942, 4.442]
60 or more				
Less than 20 years	-1.417	1.011	0.726	[-4.331, 1.497]
20 to 29 years	-0.090	0.794	1.000	[-2.379, 2.198]
30 to 39 years	-0.355	0.792	0.998	[-2.639, 1.929]
40 to 49 years	-0.868	0.824	0.898	[-3.242, 1.505]
50 to 59 years	-1.250	1.108	0.869	[-4.442, 1.942]

Because the ANOVA found significant differences in attitude scores by parental age, but the Tukey- Kramer post hoc failed to find any between-group differences, parental age group was collapsed into three categories: under 30 years of age, 30 to 39 years, and 40 years and over. ANOVA analysis was conducted to test if there were significant differences in attitude scores by parental age between the three parental age groups and once again there were significant differences between age groups, $F(2,178)= 3.344$, $p=0.038$. Tukey-Kramer post hoc analysis was conducted to determine between group differences. Attitude scores were significantly lower among parents 30 years and younger as compared to parents over 40 years ($p=0.030$). Results are presented in Table 11.

Table 11

Tukey-Kramer Post Hoc Analysis for Attitude Score Differences by 3 Parental Age Groups

Parent Age	Mean Difference	*SE*	*p*	95% CI
Less than 30 years				
30 to 39 years	-0.212	0.178	0.459	[-0.632, 0.208]
40 or more	-0.683	0.266	0.030	[-1.311, -0.054]
30 to 39 years				
Less than 20 years	0.212	0.178	0.459	[-0.208, 0.652]
30 to 39 years	-0.471	0.263	0.176	[-1.092, 0.151]
40 or more				
Less than 20 years	0.683	0.266	0.030	[0.054, 1.311]
20 to 29 years	0.471	0.263	0.176	[-0.151, 1.092]

Behavior Scale Scores

To test for differences in scores on the behavior scale between females and males and independent sample t-test was done. There were no differences in scores on the behavior scales, $t(182)=0.132$, $p=0.895$, between female ($M=5.09$, $SD=0.57$) and male

participants (*M*=5.10, *SD*=0.47). An independent sample t-test was conducted to test for differences in the behavior scales scores between participants receiving information (*M*= 5.21, *SD*=0.51) and those who were not receiving information (*M*= 5.03, *SD*=0.57). There was a statistically significant differences in behavior scale scores between participants who were receiving physical activity and/or nutrition information and those who were not, with those who were receiving information scoring higher, *M*=0.18, 95% CI[0.01, 0.35], *t*(181)=2.06, *p*=0.041, *d*=0.33.

One way analysis of variance (ANOVA) test was conducted to compare differences in the scores on the behavior scale by parent education level. Behavior scale scores increased from parents had achieved grad school (*n*=5, *M*= 4.87, *SD*=1.05) to some university (*n*=11, *M*=4.89, *SD*=0.88) to grade school (*n*=8, *M*=4.96 , *SD*=1.04) to high school (*n*=68, *M*=5.10, *SD*=1.17) to technical school (*n*=77, *M*= 5.13, *SD*=1.12) to university (*n*= 12, *M*=5.25, *SD*=1.24), but the differences were not significant *F*(5,175)=0.785, *p*=0.562. To test for differences in behavior scores by parent age a one way ANOVA was done.

Although behavior scores increased for parents age to 50 to 59 (*n*= 2, *M*=4.94, *SD*=0.39) to 20 to 29 (*n*= 73, *M*= 5.03, *SD*= 0.59) to 40 to 49 (*n*= 20, *M*= 5.10, *SD*= 0.51) to less than 20 (*n*= 3, *M*=5.11, *SD*= 0.80) to 30 to 39 (*n*=83, *M*=5.13 , *SD*=0.54) to 60 or more (*n*= 2, *M*= 5.67, *SD*=0.47), there were no significant differences in scores on the behavior scale by parents' age *F*(5,175)=0.785, *p*=0.562.

Research Question 2

What is the relationship between Peruvian preschool parents' nutrition and physical activity knowledge and attitudes with their nutrition and physical activity behavior?

There were two hypotheses for research question 2 which were as follows:

H2.1 There is no relationship between preschool parent knowledge of physical activity and nutrition and their home-based physical activity and nutrition behaviors.

H2.2 There is no relationship between preschool parent attitudes about physical activity and nutrition and their home-based physical activity and nutrition behaviors.

Pearson Correlations

To test Hypothesis 2.1 for a significant relationship between Peruvian parent's nutrition and physical activity knowledge and their nutrition and physical activity behaviors a Pearson product-moment correlation was run. The Pearson correlations are presented in Table 12 below.

Table 12

Pearson Correlation Coefficients of Knowledge, Attitude and Behavior Scales

	Behavior Scores	Knowledge Scores
Knowledge Scores	0.180*	
Attitude Scores	0.200*	0.261*

* statistically significant at $p<0.05$ level

There was a statistically significant relationship between knowledge and behavior (p=0.017). Analysis indicated a linear relationship and the Shapiro-Wilk's test showed both knowledge scores and behaviors scores to be normally distributed (p<0.05). There was a small, positive relationship between knowledge and behavior $r(177)=0.180$. To test for Hypothesis 2.2 a Pearson product-moment correlation was run. There was also a small positive relationship between attitudes and behaviors $r(174)=0.200$, p=0.008.

Shapiro-Wilk's test confirmed both attitude scores and behavior scores to be normally distributed ($p<0.05$).

Linear Regression

A linear regression analysis was conducted to see if knowledge scores significantly predicted behaviors scores. Regression analysis indicated that knowledge scores did significantly predict behavior scores, $F(1,175)= 5.846$, $p=0.017$. The predication equation was: behavior scores= 4.308+ (0.154 knowledge scores). Knowledge scores accounted for 3.2% of the variance in behavior scores having an adjusted R^2=2.9% (Cohen, 1988).

Similarly, linear regression analysis was conducted to see if parents' attitudes scores significantly predicted their behavior scores. Based on the analysis, parental attitude scores were able to significantly predict parental behavior scores, $F(1, 172)=7.131$, $p=0.008$. The linear regression equation for attitude scores prediction of behavior scores was: behavior scores= 4.693+ (0.095attitudes scores). Attitude scores accounted for 4 percent of variance in behavior scores, with an adjusted R^2=0.034 (Cohen, 1988).

Multiple Linear Regression

Finally, multiple linear regression analysis was conducted to determine if parental behavior scores could be predicted by both knowledge and attitude scores. Analysis determined that attitude and knowledge scores significantly predicted behavior scores, $F(2,166)=5.826$, $p=0.004$, $R^2=0.066$, however only the attitude added statistically significantly to the prediction ($p=0.027$). Table 13 below presents a summary of the multiple regression analysis.

Table 13

Summary of multiple linear regression analysis for behavior scores

Variable	*B*	*SE*	*β*
Constant	4.109	0.336	
Knowledge	0.123	0.066	0.146
Attitudes	0.083	0.037	0.174*

R^2=0.066, *p <0.05

Research Question 3

What proportion of Peruvian preschool parents' accurately assessed their child's weight status?

To answer research question 3 simple descriptive statistics were used to assess the frequency and percentage of two variables "parents correctly identified child weight status using verbal descriptors" and "parents correctly identified child's weight status using images". The majority of Peruvian parents were able to correctly identify their child's weight status using images (54.2%, *n*= 78) and verbal descriptors (56.6%, *n*=81). Table 14 below presents whether Peruvian parents correctly identified their child's weight, overestimated, or underestimated their weight using verbal descriptors and images.

Table14

Frequency of Parent's Ability to Identify Child's Weight Using Images and Descriptions

Parent's Classification	Verbal Descriptors		Images	
	n	%	n	%
Underestimated	55	38.5	56	38.8
Correct	81	56.6	78	54.2
Overestimated	7	4.9	10	7.0

A McNemar's test (McNemar, 1947) was used to determine if there was any difference in parental ability to correctly identify child's weight status (Yes/No) by type of descriptor (verbal or image). The McNemar's test with continuity correction (Edwards, 1948) determined that there was no statistically significant difference in the proportion of parents who correctly identified their child's weight status using verbal as compared to parents who correctly identified their child's weight status using image descriptors, $\chi^2(1) = 0.375$, $p = 0.541$.

Child Weight Status and Assessment of Child Weight

Descriptive statistics were used to describe parental ability to correctly identify child's weight status by the measured weight status of the child. Parental ability to correctly identify their child's weight status was an ordinal variable categorized into 3 groups being: underestimated child's weight status, correctly identified child's weight status, and overestimated child's weight status. Table 15 below presents the parental ability to correctly identify child's weight using verbal descriptors by the child's measured weight. Table 16 presents the parental ability to correctly identify the child's weight status using images by the child's measured weight status.

Table 15

Frequency of Parental Ability to Identify Child's Weight with Verbal Descriptors by Child's Weight

Child Weight	Underestimate		Correct		Overestimate	
	n	%	n	%	n	%
Underweight	0	0	0	0	2	100.0
Healthy	1	1.2	76	92.7	5	6.1
Overweight	47	90.4	5	9.6	0	0
Obese	7	100.0	0	0	0	0

Table 16

Frequency of Parental Ability to Identify Child's Weight Images by Child's Weight

Child Weight	Underestimate		Correct		Overestimate	
	n	%	n	%	n	%
Underweight	0	0	1	50.0	1	50.0
Healthy	8	9.6	66	79.6	9	10.8
Overweight	41	78.8	11	21.2	0	0
Obese	7	100.0	0	0	0	0

Due to sample size limitations, including the few children that were either underweight or obese, a Fisher's Exact test was used to test if there was an association between the weight status of the child (healthy weight or overweight) and the parent's ability to correctly identify their weight status using verbal descriptors. There was a statistically significant association between child's measured weight status and parental ability to identify child's weight using verbal descriptors, $p<0.001$.

Similarly, a Fisher's Exact test was used to test if there was an association between the child's measured weight status (healthy weight or overweight) and the parent's ability to correctly identify their weight status using images. The assumption that all expected cell frequencies were greater than 5 was violated, however, there was a statistically significant association between the child's measured weight and the parent's ability to correctly identify their child's weight status using images, $p<0.001$.

Research Question 4

What is the relationship between Peruvian preschool parents' characteristics and their ability to correctly evaluate their child's weight status? The four hypotheses for research question 4 were as follows:

H4.1 Demographic characteristics of Peruvian preschool parents are not related to their ability to correctly identify their child's weight status.

H4.2 Preschool parents' physical activity and nutrition knowledge is not related to their ability to correctly evaluate their child's weight status.

H4.3 Preschool parents' physical activity and nutrition attitudes are not related to their ability to correctly evaluate their child's weight status.

H4.4 Preschool parents' physical activity and nutrition behaviors are not related to their ability to correctly evaluate their child's weight status.

In order to test hypothesis H4.1, chi-square tests were conducted to assess any relationships between parental characteristics and their ability to correctly evaluate their child's weight status. In order to test hypothesis H4.2, H4.3, and H4.4, Spearman's correlations were done to assess any relationships between parental attitudes, knowledge, behaviors (based on BAQ-HH scores) and their ability to identify their child's weight status. Parental ability to correctly identify their child's weight status was an ordinal variable categorized into 3 groups being: underestimated child's weight status, correctly identified child's weight status, and overestimated child's weight status.

Parent Demographics and Assessment of Child Weight

Chi-square tests of independence were conducted to run to determine any relationship between parent demographics and correctly able to evaluate child weight

status to assess hypothesis H4.1. To test if there was a relationship between the parent's gender and their ability to correctly identify their child's weight status using verbal descriptors a chi-square test of independence was performed and found that there was no significant association, $\chi^2(2) = 0.695$, $p = 0.706$. Next, the association between parent's age and ability to correctly identify child's weight status using verbal descriptors was assessed using the chi-square test for independence. No statistically significant association was found, $\chi^2(10) = 14.868$, $p = 0.137$. Any associations between parent's education level and ability to correctly identify child's weight status was assessed and found no significant relationship, $\chi^2(10) = 13.107$, $p = 0.218$. Finally, a chi-square test of independence was conducted to test for any association between parents' receipt of physical activity and/or nutrition information and their ability to correctly identify their child's weight status using verbal descriptors. No significant association was found between the two variables, $\chi^2(2) = 4.997$, $p = 0.082$.

In order to test for any associations between the same parental demographic characteristics (gender, age, education level and receipt of physical activity and/or nutrition information) and parental ability to correctly identify their child's weight status using images, chi-square tests for independence were conducted. Table 17 below presents a summary of the chi-square tests for parental demographic characteristics by parental ability to correctly identify child's weight status using images. No significant associations were found between parental demographic characteristics and their ability to correctly identify their child's weight status using images.

Table 17

Chi-Square Analysis of Ability to Identify Child's Weight Status Using Images by Parent Demographics

Variable	df	χ^2	*p*
Gender	2	1.865	0.394
Age	10	18.29	0.050
Education	10	9.984	0.442
Receiving information	2	2.582	0.275

Parent BAQ-HH Scores and Assessment of Child Weight

To assess any relationship between parental physical activity and nutrition knowledge, attitudes or behaviors, based on BAQ-HH scales, and their ability to correctly identify their child's weight status Spearman's correlations were done in order to assess. To test hypothesis H4.2, and determine if there was a relationship between knowledge scores and parental ability to correctly identify child's weight status using verbal descriptors a Spearman's rank-order correlation was run and found no significant relationship, $r_s(135)=-0.053$, $p=0.544$. The same test used to assess hypothesis H4.3, and assess for any relationship between attitudes and parental ability to correctly identify child's weight status using verbal descriptors failed to find any significant association, $r_s(132)=0.097$, $p=0.270$. Finally, to assess hypothesis H4.4, whether there was any relationship between behavior scores and parental ability to correctly identify child's weight status using verbal descriptors, the Spearman's correlation was run again, and found no significant association, $r_s(134)=-0.055$, $p=0.530$.

Similarly, to test for any association between parent's knowledge scores and their ability to correctly identify their child's weight using images, a Spearman's rank-order correlation was done. No association was found between the two variables, $r_s(136)=-$

0.059, p=0.497. The same test was utilized to test for an association between parental attitude scores and their ability to identify their child's weight status using image and also found no association, $r_s(132)$=-0.060, p=0.493. Finally, the spearman's correlation was run once more to test association between parents scores on the behavior scale and their ability Once again, no association was found between behavior scores and ability to identify child's weight status using images, $r_s(134)$=-0.143, p=0.099.

Summary of Results

The demographic characteristics of the sample parents who participated in the study and their children were presented. Tests and results for assessing any possible relationships between the sample's demographic characteristics and the study outcomes, including parent knowledge, attitude, and behavior scores as well as their ability to correctly identify their child's weight status were presented. The results for each of the four research questions guiding the study were also presented. Key significant findings from the results included: parents' scores on the BAQ-HH attitude scales differed significantly by age (p=0.034), there was a significant relationship between parental knowledge, attitudes and behavior scores, specifically knowledge and attitudes were found to significantly predict behavior scores (p=0.004), and finally there was an association between the child's weight status as determined by BMI measures and the parents' ability to correctly identify their child's weight status using both verbal descriptors (p<0.05) and images (p<0.05).

CHAPTER V

DISCUSSION, CONCLUSION, RECOMMENDATIONS

This chapter presents the conclusions of the research study. It begins with a section that provides a brief summary of the study, including the purpose, a description of the sample and research methods employed. The second section provides a discussion of the major findings, including hypotheses tested. Strengths and limitations are also discussed. Section three presents conclusions and implications of study findings for public health and more specifically, childhood obesity research in Peru. The final chapter section makes recommendations for future research.

Summary of the Study

The purpose of the study was to assess Peruvian parents' knowledge, attitudes, and behaviors regarding home-based nutrition and physical activity for their preschool aged children, and to determine if there is a relationship between nutrition and physical activity knowledge, attitudes, and behaviors of the parents. The Pen-3 Model was utilized in developing the study purpose and design, and interpretation of the findings in order to gain an understanding of Peruvian parental perceptions within a cultural context. The cross-sectional survey study included a sample 204 parents of preschoolers living in the *pueblo nuevo* communities of San Juan de Miraflores, Lurin, and Villa Maria del Triunfo in southern Lima, Peru. Most participants were female (86%) between 20 and 39 years old (85.1%). The majority of the parents had more than a high school education (55.2%) but less than one third (30.5%) were receiving information about nutrition and/or physical activity at the time of the study. The BMI and demographic data was available for 147 children of the participants. The children were predominantly female (53.7%)

with a mean age of 49.4 months and a mean BMI of 16.7. Nearly half the children (41.3%) exceeded healthy weight.

Parents were invited for participation through an invitation letter sent home by their children's teacher, and completed a modified version of the BAQ-HH instrument at one of five participating public and private preschool sites while dropping off or picking up their child. The BMI measures of the children were extracted from school health records by school staff. Children's BMI was calculated using the standard definition and weight status was categorized using standardized WHO definitions of BMI for age (citations).

Discussion

Prior to this study there had been nothing in the literature describing Peruvian parents knowledge, attitudes and behaviors regarding physical activity and nutrition for their preschool children, in spite of the critical role parents have in the prevention of childhood obesity. The results of the four research questions guiding the study provide unique insight into the knowledge, attitudes and behaviors of Peruvian parents, and how those may differ from other ethnic groups of Hispanic parents. Additionally, the results identify the accuracy of the perceptions that Peruvian parents have about their child's weight, and the characteristics of the children and the parents that influence these perceptions.

Outcomes of Research Questions and Hypotheses

The first research question sought to establish Peruvian parents' knowledge, attitudes and behaviors regarding home-based physical activity and nutrition. Parents answered questions using responses on a likert-scale, with responses of 4 and above

indicating healthier knowledge and behaviors, and responses of 4 and above indicating unhealthy attitudes (Henry et al, 2014). Peruvian parents had mean scores of 5.14 (*SD*=0.70, *n*=188) on the knowledge scale, 4.07 (*SD*=1.12, *n*=182) on the attitudes scale, and 5.09 (*SD*= 0.56, *n*=184) behaviors scales. Results provide evidence that while Peruvian parents exhibit knowledge of and practice healthy behaviors, their attitudes regarding home-based physical activity and nutrition are unhealthy. Henry and colleagues (2013) assess Mexican-American parents' knowledge, attitudes and behaviors using the BAQ-HH and found similarly healthy knowledge and behavior scores among Mexican-American parents as compared to the Peruvian parents in the sample. Conversely, in Henry's study the Mexican-American parents had healthier attitudes scores, indicating Peruvian parents may have less healthy attitudes towards nutrition and physical activity as compared to other Hispanic parents (Henry, et al. 2013).

The second research question investigated if there was any relationship between parents' scores on knowledge and attitudes scales and their scores on the behaviors scale. Both knowledge scores ($r(177)=0.180$, $p=0.017$) and attitudes scores ($r(174)=0.200$, $p=0.008$) were found to be associated with and predictive ($F(2,166)=5.826$, $p=0.004$, $R^2=0.066$) of behavior scores. The study findings contradicted the hypotheses H2.1 and H2.2 that postulated that there is no relationship between knowledge scores or attitude scores and parental behavior scores. Both hypotheses were rejected. This finding is expected as previous studies with Hispanic parents have found that increasing parental knowledge of nutrition and physical activity improves behaviors (Barkin et al., 2012, Contento, et al., 1993). Results demonstrate that knowledge of healthy behaviors among Peruvian parents does predict the practice of healthy behaviors

however, unhealthy attitudes towards physical activity and nutrition are actually predictive of healthy behaviors. This finding is unexpected, but it is possible that because the BAQ-HH measures attitudes as "level of concern", so a high level of concern is considered to be unhealthy in the BAQ-HH, parental concern might predict their behaviors. Contento and colleagues (1993) similarly found that high nutrition knowledge among Dominican mothers of preschool children predicted healthy dietary and feeding behaviors, however in their study mother's unhealthy attitudes about feeding practices did also predict unhealthy behaviors (Contento, et al., 1993).

Prior to intervening with parents, their perceptions of their child's weight must first be understood. These perceptions often vary by culture and ethnicity. The third research question sought to assess the proportion of Peruvian parents who were able to accurately assess their preschool child's weight status. While the majority of parents were able to correctly identify their child's weight status using both verbal descriptors (56.6%, *n*=81) and images (54.2%, *n*= 78), this was not the case amongst parents of overweight and obese children. Amongst those parents, only 9.6% and 21.2% were able to correctly identify their child's weight status using verbal descriptors and images, respectively. Hispanic and other ethnic minorities are more likely to underestimate their child's weight (Gauthier, Glance-Cleveland, 2016), however, in this study the majority of Peruvian parents were able to correctly describe their child's weight status using two different methods.

While Peruvian parents were more likely than other groups of Hispanic parents to correctly identify their weight status (Sosa, 2012), similar findings of Peruvian parents of overweight children have been reported in other groups of Hispanic parents of

overweight children. In both Chaparro (2011) and Ariza (2004) studies of predominantly Mexican-American mothers of overweight children and Hirschler's study (2006) of Argentinian mothers of overweight three to five year olds, they also found that the majority of these mothers were unable to identify their child as being overweight (Ariza, et al., 2004, Hirchler et al, 2006). Hispanic parents of overweight children are unlikely to recognize their child as being overweight.

In this study though, the majority of parents of overweight and obese children underestimated their weight. Study results demonstrate that while parents of children of healthy weight have accurate perceptions of their child's weight, Peruvian parents of overweight children do not tend to have accurate perceptions of their child's weight. In this study, nearly all (90.4%) of parents of overweight or obese children were unable to accurately identify their child as being overweight or obese using verbal descriptors. This is similar to previous findings in the literature (Baughcum, et al.,2000). Research has established that Hispanic parents often associate excess weight in preschool children with health, highlighting the need to intervene with these parents.

The final research question examined whether Peruvian parents' socio-demographic characteristics' were associated with their ability to predict their child's weight status. Results indicated that parental characteristics, including their: gender ($\chi^2(2) =0.695$, $p=0.706$), age ($\chi^2(10) =14.868$, $p=0.137$), level of education ($\chi^2(10) =13.107$, $p=0.218$), and receipt of physical activity and/or nutrition information ($\chi^2(2) =4.997$, $p=0.082$), were associated not with their ability to correctly identify their child's weight status. Moreover, parental scores of the BAQ-HH knowledge ($r_s(135)=-0.053$, $p=0.544$), attitude ($r_s(132)=0.097$, $p=0.270$), and behavior scales ($r_s(134)=-0.055$, $p=0.530$) were

also not significantly associated with their ability to correctly identify their child's weight status using either verbal descriptors or images.

Study findings supported the hypotheses H4.1, H4.2, H4.3, and H4.4, which postulated that there was no relationship between parental demographic characteristics and BAQ-HH scores and their ability to accurately assess their child's weight. Study results failed to reject each of the four hypotheses for research question 4. This is not surprising as similar findings have been reported in the literature with other Hispanic parents of preschool children. Chapparo and colleagues (2011) also found no relationship between Mexican-American parental socio-demographic characteristics and their ability to perceive their child's weight. In their study maternal BMI and child's birth weight, two variables not examined in this study, were related to parental ability to identify child's weight status (Chapparo, et al, 2011). Findings suggest that BMI characteristics of both the children and the parents might be better indicators of parental perceptions of child's weight. Table 18 below presents the outcomes of the six study hypotheses.

Study Outcomes and Pen-3 Constructs

The Pen-3 cultural model was used to guide the study design and interpret the data within the context of the Peruvian culture. During the study design phase, items on the survey instrument were categorized according to Pen-3 construct. Parental responses to these survey items were used to identify the perceptions, enablers and nurturers of Peruvian parents, and whether they were positive, negative or existential in nature. Table 18 below highlights select parental perceptions and enablers identified in the study results, and outlines them according to if whether are positive, negative, or existential for physical activity and nutrition behaviors.

Table 18.

Pen-3 Perceptions and Enablers of Peruvian Parents Identified Through BAQ-HH Items

Pen-3 Constructs	Positive	Negative	Existential
Perceptions:			
Child's weight	More than half (56.6%) of Peruvian parents were able to correctly identify their child's weight.	Very few (parents (9.6-21.2%) of overweight and obese children identified their child as being overweight or obese.	There was no difference in Peruvian parent's ability to correctly identify their child's weight status based on their age, gender, or education level.
Child's diet	Parents were knowledgeable about the importance of "the portion size of food and cutting down on sodas" for their child.	Parents indicated a high degree of worry about "their child eating too much when they are not around".	Nearly half of parents (45.9%) reported their child drank 3 or more sugary beverages daily.
Child's physical activity	Parents indicated they were knowledgeable about the "importance of balancing eating with physical activity" for their child.	Parents indicated a high degree of worry about "a lack of physical activity or sports time" for their child.	Only 12.6 percent of parents reported that their child received the recommended amount of physical activity.
Enablers:			
Parents' receipt of information on physical activity and/or nutrition	94.8 percent of parents felt the information they received helped them to make healthy decisions for their families.	Only 30.5 percent of Peruvian parents were receiving information about physical activity/ and or nutrition	Radio talk shows, the internet, TV, and magazines were commonly reported sources of information.

Demographic characteristics of Parents and Children

In addition to assessing the outcomes of the four guiding research questions, study findings also contributed important information on the socio-demographic and behavioral characteristics of Peruvian parents and children.

Overweight and Obesity Prevalence in Peruvian Preschool Children. Prior to this study, the literature reported that childhood obesity in Peru has been increasing since 1990 and that 13.1% of children under five were overweight or obese (Loret de Mola et al, 2014, Busse & Diaz, 2014, Uauy, et al., 2001). The results of the present study not only corroborate previous findings, with 11.7% of children 2 through 5 years of age in the sample being overweight and an additional 4.8% of the children being obese, but also possibly indicate an increase in the prevalence of overweight and obesity in Peruvian preschool children. In developing countries, higher SES, allowing for increased access to caloric-dense food, has been identified as a risk factor for childhood obesity (Murasko, 2011).

The study sample consisted of families living in low-income communities, with limited fast-food consumption (68.7% of children ate only one or no fast food meals weekly), however overweight and obesity prevalence exceeded previously reported rates from higher SES populations in Peru (Loret de Mola et al, 2014, Uauy, et al., 2001).

Peruvian Children at Risk of Being Overweight. In addition to the 16.5% of children in the study sample who were either overweight or obese, another 24.8% of the children had a BMI-for-age measure that classified them as at "possible risk for being overweight" as defined by WHO (World Health Organization, 2008). The number of Peruvian preschool children who fall into this category has not been previously reported

in the literature. WHO further describes these children as being at an additional increased risk if they have at least one overweight parent (World Health Organization, 2008). The majority of adults in Peru (62.3%) are overweight or obese, indicating the high likelihood of these children having an overweight parent, thereby being at additional heightened risk for overweight or obesity Loret de Mola, et al., 2014, Alvarez-Dongo, et al., 2012).

This weight classification becomes even more pertinent when considering the biological and behavioral changes occurring at the preschool age. As stated previously, preschoolers are at an age immediately preceding a period of adiposity rebound, in which children experience a rapid increase in BMI (Trost, et al, 2015). Moreover, physical activity, an established protective factor against obesity, is known to decrease as preschool children age into middle childhood (DeBock, et al., 2013). This is particularly startling considering the large proportion of children in the study sample (87.4%) who are already not receiving the recommended amount of physical activity. These considerations might help to explain the differences reported in the literature in the prevalence of overweight and obese children in the preschool age (13.1%) and in older children in Peru (25%) (Carrillo-Larco, et al., 2014, Busse & Diaz, 2014). Based on study findings, reporting only the prevalence of children who are overweight and obese, while omitting a large proportion of children who are borderline overweight, inaccurately depicts state of the childhood obesity epidemic in Peru.

Peruvian Parents' Sources of Health Information. In response to the emerging obesity epidemic Peru's Ministry of Health established in 2011 the "Estrategia Sanitaria Nacional de Alimentacion y Nutricion Saludable" (National Health Strategy for Healthy Feeding and Nutrition). This was a national strategy that established a goal of reducing

overweight and obesity prevalence in children five years of age and under by 2021, in addition to other goals of reducing obesity amongst all age groups within the Peruvian population (Chaparro & Estrada, 2012). Unfortunately, no specific strategies for achieving this goal were outlined. In spite of a lack of strategic planning, the Peruvian government accounted for the most frequently cited source of physical activity and/or health information among parents in the study (18.6%). Unfortunately, only 30.5 percent of parents responded that they were receiving information, however the Ministry of Health, government sponsored community health centers and government sponsored nutritionists accounted for much of the information received by parents, and nearly 100 percent of respondents felt that this information was helpful in them making healthy decisions for their families.

This indicates that possible government strategies for reducing overweight and obesity in preschool children could include reaching more parents with health information through these outlets.

Parents' Ability to Correctly Identify their Child's Weight Status. Prior to intervening with parents, their perceptions of their child's weight must first be understood. These perceptions often vary by culture and ethnicity. Hispanic and other ethnic minorities are more likely to underestimate their child's weight (Gauthier, Glance-Cleveland, 2016), however, in this study the majority of parents (54.2 and 56.6%) were able to correctly describe their child's weight status using two different methods. In this study though, the majority of parents of overweight and obese children underestimated their weight. Study results demonstrate that while parents of children of healthy weight have accurate perceptions of their child's weight, Peruvian parents of overweight children

do not tend to have accurate perceptions of their child's weight. In this study, nearly all (90.4%) of parents of overweight or obese children were unable to accurately identify their child as being overweight or obese using verbal descriptors. This is similar to previous findings in the literature (Baughcum, et al., 2000). Research has established that Hispanic parents often associate excess weight in preschool children with health, highlighting the need to intervene with these parents. Parent's age, gender or education did was not associated with their ability to accurately assess their child's weight in this study.

Diet and Physical Activity in Peruvian Preschool Children. Study results highlighted important diet and physical activity behaviors of Peruvian preschool children. Several positive diet behaviors emerged from the results including the frequency that children eat dinner with parents, the frequency that they eat their meals at home, and the infrequency that they consume fast food. An unhealthy dietary behavior of the children was their consumption of sugary beverages. The Silveira 2014 study found that 40 percent of Brazilian preschoolers consumed sugar sweetened beverages four times a week and 25 percent consumed them daily (Silveria, et al.,2014). Busse and Diaz found that 100 percent of children consumed soda on a weekly basis (Busse & Diaz, 2014). This study found similarly high rates of consumption of sugar sweetened beverages, with 79.6% of children consuming 2 or more sugary beverages daily. These results highlight the need for interventions aimed at decreasing sweetened beverage consumption in Peruvian children.

Physical activity behaviors of the sample were alarming. Physical activity was infrequent in the study population. Nearly three quarters (72.7%) of the children in the

sample were physically active three days or less each week. Moreover, physical inactivity was common as demonstrated by the amount of screen time preschool children were receiving. Nearly 40 percent of preschool children (39.8%) were spending more than 2 hours a day watching TV or on the computer. These results highlight the need for interventions aimed at increasing physical activity and decreasing screen time in Peruvian preschoolers.

Conclusions

Implications for Public Health

The results of this study contribute to the current knowledge of the childhood obesity epidemic occurring in Latin America, and specifically Peru. There is a dearth of information in the literature characterizing parental perceptions of childhood obesity prevention among Peruvians, in spite of the increasing rates of childhood obesity in the population. This study serves an important role in beginning to fill in the gap in the literature on Peruvian parental perceptions of childhood obesity preventive behaviors for their preschool children.

Findings of the study fill in the gap on Peruvian parent's knowledge, attitudes and behaviors regarding home-based physical activity and nutrition and how their knowledge and attitudes are related to their behaviors. This is also the first study to assess the accuracy of Peruvian parent's perceptions of their child's weight, and parent and child characteristics that influence parents' perceptions. Moreover, the study characterized the nutrition and physical activity behaviors of Peruvian preschool children, and contributed to the limited body of literature on the prevalence of childhood overweight and obesity in Lima, Peru.

Peruvian parents demonstrated healthy knowledge of nutrition and physical activity, and healthy behaviors. Unfortunately they also demonstrated unhealthy, or very concerned attitudes, indicating that their worry or concern about their child's diet and physical activity behaviors may prompt them to healthier behaviors. Although the BAQ-HH classifies high concern as an unhealthy attitude, a high level of concern about their child's nutrition and physical activity seems to prompt Peruvian parents to healthy behaviors.

In order to intervene with parents of overweight children, parents must first recognize their overweight child as being overweight, and then recognize that it is a health risk for their child. Although Peruvian parents also demonstrated accurate perceptions of their child's weight (54%), one of the concerning findings from the study was the inability of parents of overweight and obese children to recognize their child as being overweight or obese, 38% of all Peruvian parents underestimated their child's weight.

Finally the study also contributed important information on the frequency of health behaviors of the children themselves. Key findings included the frequency of consumption of sugary beverages and the lack of physical activity among preschool children in Peru. No previous studies have assessed these behaviors, and findings indicate an urgent need for intervention in these behaviors.

Strengths and Limitations

The greatest strength of the study is the information it contributes to the currently limited body of knowledge on the emerging childhood obesity epidemic in Peru. This is the only known study to explore Peruvian parents knowledge, attitudes and behaviors

regarding home-based physical activity and nutrition for their preschool children. Childhood obesity is an emerging issue across Latin America, and the study provides important findings to address childhood obesity prevention with Peruvian parents. First, this study was able to establish important baseline data about both Peruvian parents and children in regards to physical activity and nutrition knowledge, attitudes and behaviors. This study depicted the frequency of healthy and unhealthy nutrition and physical activity behaviors amongst Peruvian preschoolers, allowing for the identification of the focus of future interventions. Another strength of the study is that it included data from both parents and their children, which allowed the comparison of parents' perceptions with their children's actual weight. Finally, one last strength of the study is that it used clinically measured weight and height of the child, rather than parent report. This allowed for accurate determination of the children's BMI.

When interpreting the salient findings of the study, several limitations need to be kept in mind. First, the study was cross sectional in nature, preventing the establishment of any cause and effect relationship between parent perceptions of home-based physical activity and nutrition behaviors and child's weight status. Secondly, the study utilized convenience sampling rather than random sampling. The study setting was limited to five preschool sites in the *pueblo nuevos* of southern Lima, thereby limiting generalizability of the findings to the greater Lima or Peruvian population. Additionally, the study sample was predominantly female, limiting generalizability to fathers of preschool children.

Parents were recruited from and completed the surveys at school sites where their children's teachers and the researchers were present, and although their responses were protected for anonymity, completing the study at the school site may have influenced the

participants to provide socially desirable biased responses to the items on the knowledge, attitudes and behaviors scales. One final methodological limitation of the study was the fact that parent surveys and BMI measures were not collected at the same time. BMI measures were extracted from school health records. Prior to enrolling for the school year, each child must undergo a physical. Peruvian schools are required to keep this information on file. Parents' completed the surveys mid school year, and therefore there may have been changes in the child's BMI or weight status after the medical exam and prior to the time of the survey.

Recommendations and Future Research

The results of the study have important research and policy implications. In response to the lack of specific strategies to achieve a nationally established goal of reducing overweight and obesity, the study results provide several focus areas for possible government strategies and future interventions. The study found that although the majority of parents weren't receiving nutrition and physical activity information, the government sponsored physical activity and/or nutrition information that they are obtaining has been well received by parents. Future policy efforts need to focus on expanding the population reached with this information. The information also needs to be revised to include specific and targeted messages in regards to reducing children's consumption of sugary beverages and increasing their physical activity, as these were the most frequently exhibited unhealthy behaviors of children and families.

Other policies might target these unhealthy behaviors directly. Some governments, including US state governments, have implemented taxes to curb consumption of sodas and other sugary beverages (McCarthy, 2016), this might be one

policy consideration for the Peruvian government in order to address this health concern. Lack of children's physical activity was one unhealthy behavior identified by the study. Parents responded that the lack of places for their children to be physically active was a concern. Developing community resources to include more parks and green spaces might be another strategic area of focus for the Peruvian government to achieve their national goals of obesity reduction.

This was the first study to explore the physical activity and nutrition perceptions of Peruvian parents, thereby demonstrating the need for future research in this area. Based on the study results, future recommendations for research would include:

1) A study to further explore the specific attitudes held by parents of preschool children regarding physical activity and nutrition. Parents in the study were characterized as having unhealthy attitudes towards physical activity and nutrition, however the specific attitudes and scope of the attitudes are still not understood. Understanding the full scope of the attitudes held by Peruvian parents might help to inform interventions to promote positive attitudes.
2) A longitudinal study of the children identified in this study as being at risk for overweight is warranted. Nearly one quarter of the children in the study sample fell into this weight status, and the risk of future obesity and negative health outcomes for these children is unknown. Longitudinal studies that can identify their specific risks of becoming overweight or obese in later childhood or adolescents are warranted to better understand this population. Risk factors that contribute to these children eventually becoming overweight need to be identified.

3) Studies assessing the relationship between other parental and child characteristics not explored in this study and parental ability to identify weight status are warranted. Studies examining the relationship between parents' weight and their perception of child's weight in other Hispanic ethnic groups have provided important insight into this phenomenon and are necessitated in the Peruvian population.

4) Finally, follow up studies assessing whether Peruvian parents recognize the health risk of excess weight in their children would expand upon study findings and provide insight into interventions with these parents. Understanding parental risk factors preventing them from recognizing their child as overweight, and seeing this as a health risk, is an important component to address when designing interventions with parents of overweight children (Gauthier, et al., 2016).

REFERENCES

Adult Obesity Facts. (2016, September 01). Retrieved from https://www.cdc.gov/obesity/data/adult.html

Airhihenbuwa, C. O. (1995). *Health and culture: Beyond the Western paradigm*. Sage.

Airhihenbuwa, C. O., & Webster, J. D. (2004). Culture and African contexts of HIV/AIDS prevention, care and support. *Journal of Social Aspects of HIV/AIDS Research Alliance, 1*(1), 4-13.

Alexander, M. A., Sherman, J. B., & Clark, L. (1991). Obesity in Mexican-American preschool children: a population group at risk. *Public Health Nursing*, *8*(1), 53-58.

Alhassan, S., Sirard, J. R., & Robinson, T. N. (2007). The effects of increasing outdoor play time on physical activity in Latino preschool children. *International Journal of Pediatric Obesity*, *2*(3), 153-158.

Álvarez-Dongo, D., Sánchez-Abanto, J., Gómez-Guizado, G., & Tarqui-Mamani, C. (2012). Overweight and obesity: Prevalence and determining social factors of overweight in the Peruvian population (2009-2010). *Revista Peruana de Medicina Experimental y Salud Publica*, *29*(3), 303-313.

Ariza, A. J., Chen, E. H., Binns, H. J., & Christoffel, K. K. (2004). Risk factors for overweight in five-to six-year-old Hispanic-American children: A pilot study. *Journal of Urban Health*, 81(1), 150-161.

Atalah, E., Amigo, H., & Bustos, P. (2014). Does Chile's nutritional situation constitute a double burden?. *The American Journal of Clinical Nutrition*, *100*(6), 1623S-1627S.

Barkin, S. L., Gesell, S. B., Po'e, E. K., Escarfuller, J., & Tempesti, T. (2012). Culturally tailored, family-centered, behavioral obesity intervention for Latino-American preschool-aged children. *Pediatrics*, *130*(3), 445-456.

Barroso, C. S., Roncancio, A., Hinojosa, M. B., & Reifsnider, E. (2012). The association between early childhood overweight and maternal factors. *Childhood Obesity*, *8*(5), 449-454.

Baughcum, A. E., Chamberlin, L. A., Deeks, C. M., Powers, S. W., & Whitaker, R. C. (2000). Maternal perceptions of overweight preschool children. *Pediatrics*, *106*(6), 1380-1386.

Bellows, L. L., Davies, P. L., Anderson, J., & Kennedy, C. (2013). Effectiveness of a physical activity intervention for Head Start preschoolers: a randomized intervention study. *American Journal of Occupational Therapy*, *67*(1), 28-36.

Burdette, H. L., Whitaker, R. C., & Daniels, S. R. (2004). Parental report of outdoor playtime as a measure of physical activity in preschool-aged children. *Archives of Pediatrics & Adolescent Medicine, 158(*4), 353.

Busse, P., & Díaz, R. (2016). What are the television viewing and eating habits of children in Peru?. *Global Health Promotion*, *23*(1), 50-60.

Brown, W. H., Googe, H. S., McIver, K. L., & Rathel, J. M. (2009). Effects of teacher-encouraged physical activity on preschool playgrounds. *Journal of Early Intervention, 31*(2), 126-145.

Caprio, S., Daniels, S. R., Drewnowski, A., Kaufman, F. R., Palinkas, L. A., Rosenbloom, A. L., & Schwimmer, J. B. (2008). Influence of race, ethnicity, and culture on childhood obesity: Implications for prevention and treatment a consensus statement of shaping America's health and the obesity society. *Diabetes Care, 31*(11), 2211-2221.

Carrillo-Larco, R. M., Bernabé-Ortiz, A., & Miranda, J. J. (2014). Short sleep duration and childhood obesity: Cross-sectional analysis in Peru and patterns in four developing countries. *PloS One, 9*(11), e112433.

Carrillo-Larco, R. M., Miranda, J. J., & Bernabé-Ortiz, A. (2016). Impact of Food Assistance Programs on Obesity in Mothers and Children: a Prospective Cohort Study in Peru. *American Journal of Public Health*, *106*(7), 1301-1307.

Chaparro, M. P., & Estrada, L. (2012). Mapping the nutrition transition in Peru: evidence for decentralized nutrition policies. *Revista Panamericana de Salud Pública, 32*(3), 241-244.

Childhood Obesity Facts. (2016, December 22). Retrieved from https://www.cdc.gov/obesity/data/childhood.html

Contento, I. R., Basch, C., Shea, S., Gutin, B., Zybert, P., Michela, J. L., & Rips, J. (1993). Relationship of mothers' food choice criteria to food intake of preschool children: Identification of family subgroups. *Health Education Quarterly*, *20*(2), 243-259.

Cruz, T. H., Davis, S. M., Myers, O. B., O'Donald, E. R., Sanders, S. G., & Sheche, J. N. (2016). Effects of an obesity prevention intervention on physical activity among preschool children: the CHILE study. *Health Promotion Practice*, *17*(5), 693-701.

De Bock, F., Genser, B., Raat, H., Fischer, J. E., & Renz-Polster, H. (2013). A Participatory Physical Activity Intervention in Preschools: A Cluster Randomized Controlled Trial. *American Journal of Preventive Medicine, 45*(1), 64-74.

De Mola, C. L., Quispe, R., Valle, G. A., & Poterico, J. A. (2014). Nutritional transition in children under five years and women of reproductive age: a 15-years trend analysis in Peru. *PloS One, 9*(3), e92550.

De Onis, M., Blössner, M., & Borghi, E. (2012). Prevalence and trends of stunting among pre-school children, 1990–2020. *Public Health Nutrition, 15*(01), 142-148.

Donroe, J., Gilman, R. H., Brugge, D., Mwamburi, M., & Moore, D. A. J. (2009). Falls, poisonings, burns, and road traffic injuries in urban Peruvian children and adolescents: a community based study. *Injury Prevention*, *15*(6), 390-396.

Dubois, L., & Girard, M. (2006). Early determinants of overweight at 4.5 years in a population-based longitudinal study. I*nternational Journal of Obesity, 30*(4), 610-617.

Eckstein, K. C., Mikhail, L. M., Ariza, A. J., Thomson, J. S., Millard, S. C., & Binns, H. J. (2006). Parents' perceptions of their child's weight and health. *Pediatrics, 117*(3), 681-690.

Edwards, A. L. (1948). Note on the "correction of continuity" in testing the significance of the difference between correlated proportions. Psychometrika,, 13, 185-187.

Emma, L., & Jarrett, M. National Center for Physical Development and Outdoor Play, Head Start Body Start. (2010). How we play- cultural determinants of physical activity in young children. Retrieved from http://www.aahperd.org/headstartbodystart/activityresources/upload/howweplay_litreview.pdf

Eyre, E. L. J., & Duncan, M. J. (2013). The impact of ethnicity on objectively measured physical activity in children. *ISRN Obesity*, 2013.

Filozof, C., Gonzalez, C., Sereday, M., Mazza, C., & Braguinsky, J. (2001). Obesity prevalence and trends in Latin-American countries. *Obesity Reviews, 2*(2), 99-106.

Finn, K., Johannsen, N., & Specker, B. (2002). Factors associated with physical activity in preschool children. *The Journal of Pediatrics, 140*(1), 81-85.

Gauthier, K. I., & Krajicek, M. J. (2013). Obesogenic environment: a concept analysis and pediatric perspective. *Journal for Specialists in Pediatric Nursing*, *18*(3), 202-210.

Gauthier, K. I., & Gance-Cleveland, B. (2015). Hispanic parental perceptions of child weight in preschool-aged children: An integrated review. *Childhood Obesity*, 11(5), 549-559.

Gonzalez-Casanova, Sarmiento, Pratt, Gazamrian, Martorell, Cunningham, and Stein. (2014). Individual, family, and community predictors of overweight and obesity among Colombian children and adolescents. *Preventing Chronic Disease,* 11, 140065 .

Henry, B. W., Smith, T. J., & Ahmad, S. (2014). Psychometric assessment of the Behavior and Attitudes Questionnaire for Healthy Habits: measuring parents' views on food and physical activity. *Public Health Nutrition, 17*(05), 1004-1012.

Hirschler, V., Acebo, H., Fernandez, G. B., de Luján Calcagno, M., Gonzalez, C., & Jadzinsky, M. (2006). Influence of obesity and insulin resistance on left atrial size in children. *Pediatric Diabetes*, *7*(1), 39-44.

How much physical activity do children need? (2015, June 04). Retrieved from https://www.cdc.gov/physicalactivity/basics/children/

Iwelunmor, J., Newsome, V., & Airhihenbuwa, C. O. (2013). Framing the impact of culture on health: a systematic review of the PEN-3 cultural model and its application in public health research and interventions. *Ethnicity & Health, 19*(1), 20-46.

Jacoby, E., Goldstein, J., López, A., Núñez, E., & López, T. (2003). Social class, family, and life-style factors associated with overweight and obesity among adults in Peruvian cities. *Preventive Medicine*, *37*(5), 396-405.

Kain, J., Concha, F., Moreno, L., & Leyton, B. (2014). School-based obesity prevention intervention in Chilean children: effective in controlling, but not reducing obesity. *Journal of Obesity*, *2014*.

Kramer, M. S., Barr, R. G., Leduc, D. G., Boisjoly, C., & Pless, I. B. (1983). Maternal psychological determinants of infant obesity: Development and testing of two new instruments. *Journal of Chronic Diseases, 36*(4), 329-335.

Larsen, J. K., Hermans, R. C., Sleddens, E. F., Engels, R. C., Fisher, J. O., & Kremers, S. P. (2015). How parental dietary behavior and food parenting practices affect children's dietary behavior: Interacting sources of influence?. *Appetite*, *89*, 246-257.

Lindsay, A.C., Sussner, K.M., Greaney, M.L., & Perterson, K.F. (2009). Influence of social context on eating, physical activity, and sedentary behaviors of Latina

mothers and their preschool-age children. *Health Education and Behavior, 36*(1), 81-96.

Lioret, S., Touvier, M., Lafay, L., Volatier, J., & Maire, B. (2008). Dietary and physical activity patterns in French children are related to overweight and socioeconomic status. *The Journal of Nutrition, 138*(1), 101-107.

Lozano-Rojas, G., Cabello-Morales, E., Hernádez-Diaz, H., & Loza-Munarriz, C. (2014). Prevalencia de sobrepeso y obesidad en adolescentes de un distrito urbano de Lima, Perú 2012. *Revista Peru Medicina Salud Publica, 31*(3), 494-500.

Kostecka, M. (2014). Eating habits of preschool children and the risk of obesity, insulin resistance and metabolic syndrome in adults. *Pakistan Journal of Medical Sciences*, *30*(6), 1299.

Kramer, M. S., Barr, R. G., Leduc, D. G., Boisjoly, C., & Pless, I. B. (1983). Maternal psychological determinants of infant obesity: Development and testing of two new instruments. *Journal of Chronic Diseases, 36*(4), 329-335.

Mazrui, A. A. (1986). Cultural forces in African politics: In search of a synthesis. Africa and the West: the legacies of empire. Greenwood Press, New York.

Masterson, R. M. M., Smeeth, L., Gilman, R. H., & Miranda, J. J. (2010). Physical activity and cardiovascular risk factors among rural and urban groups and rural-to-urban migrants in Peru: a cross-sectional study. Revista Panamericana de Salud Pública, 28(1), 1-8.

McCarthy, M. (2016). Soda tax brings sharp fall in sugary drink consumption in Californian city. *British Medical Journal*, 355.

McKenzie, T. L., Sallis, J. F., Broyles, S. L., Zive, M. M., Nader, P. R., Berry, C. C., & Brennan, J. J. (2002). Childhood movement skills: Predictors of physical activity in Anglo American and Mexican American adolescents. *Research Quarterly for Exercise and Sport, 73(*3), 238-244.

McKenzie, T.L., Sallis, J.F., Elder, J.P., Berry, C.C., Hoy, P.L., Nader, P.R., Zive, M.M., & Broyles, S.L. (1997). Physical activity levels and prompts in young children at recess: a two-year study of a bi-ethnic sample. *Research Quarterly for Exercise and Sport, 68(*3), 195-202.

McNemar, Q. (1947). Note on the sampling error of the difference between correlated proportions or percentages. *Psychometrika, 12*, 153-157.

Metzgar, C. J., Preston, A. G., Miller, D. L., & Nickols J., Richardson, S. M. (2015). Facilitators and barriers to weight loss and weight loss maintenance: a qualitative exploration. *Journal of Human Nutrition and Dietetics*, *28*(6), 593-603.

Mispireta, M. L. (2012). Determinantes del sobrepeso y la obesidad en niños en edad escolar en Perú. *Revista Peruana de Medicina Experimental y Salud Pública, 29(*3), 361-365.

Murasko, J. E. (2011). Trends in the associations between family income, height and body mass index in US children and adolescents: 1971–1980 and 1999–2008. *Annals of Human Biology*, *38*(3), 290-306.

Nader, P. R., O'Brien, M., Houts, R., Bradley, R., Belsky, J., Crosnoe, R., & Susman, E. J. (2006). Identifying risk for obesity in early childhood. *Pediatrics, 118*(3), e594-e601.

Nuestro Distrito, San Juan de Miraflores. (2016). Retrieved from http://www.munisjm.gob.pe/historia

Obesity and overweight. (n.d.). Retrieved from http://www.who.int/mediacentre/factsheets/fs311/en/

Ogden, C. L., Carroll, M. D., Curtin, L. R., Lamb, M. M., & Flegal, K. M. (2010). Prevalence of high body mass index in US children and adolescents, 2007-2008. *The Journal of the American Medical Association, 303*(3), 242-249.

Ogden, C. L., Carroll, M. D., Kit, B. K., & Flegal, K. M. (2014). Prevalence of childhood and adult obesity in the United States, 2011-2012. *The Journal of the American Medical Association, 311(*8), 806-814.

Pan American Health Organization, 53rd Directing Council. (2014). Plan of action for the prevention of obesity in children and adolescents. Retrieved from http://www.paho.org/hq/index.php?option=com_docman&task=doc_view&Itemid=270&gid=28890&lang=pt

Pajuelo-Ramírez, J., Miranda-Cuadros, M., Campos-Sánchez, M., & Sánchez-Abanto, J. (2011). Prevalencia de sobrepeso y obesidad en niños menores de cinco años en el Perú 2007-2010. *Revista Peruana de Medicina Experimental y Salud Pública*, *28*(2), 222-227.

Pate, R. R., Pfeiffer, K. A., Trost, S. G., Ziegler, P., & Dowda, M. (2004). Physical activity among children attending preschools. *Pediatrics, 114*(5), 1258-1263.

Perez Rodrigo, C. P. (2013). Current mapping of obesity. *Nutrition Hospitalaria, 28*(Suppl 5), 21-31.

Popkin, B. M., & Gordon-Larsen, P. (2004). The nutrition transition: worldwide obesity dynamics and their determinants. *International Journal of Obesity,* 28, S2-S9.

Principios de la Educación Inicial. (2016). Retrieved April 24, 2016, from www.mined.gob.pe/educacion-incial/

Proctor, M. H., Moore, L. L., Gao, D., Cupples, L. A., Bradlee, M. L., Hood, M. Y., & Ellison, R. C. (2003). Television viewing and change in body fat from preschool to early adolescence: The Framingham Children's Study. *International Journal of Obesity, 27*(7), 827-833.

Rich, S. S., DiMarco, N. M., Huettig, C., Essery, E. V., Andersson, E., & Sanborn, C. F. (2005). Perceptions of health status and play activities in parents of overweight Hispanic toddlers and preschoolers. *Family & Community Health, 28*(2), 130-141.

Saldiva, S. R. D. M., Venancio, S. I., de Santana, A. C., da Silva Castro, A. L., Escuder, M. M. L., & Giugliani, E. R. J. (2014). The consumption of unhealthy foods by Brazilian children is influenced by their mother's educational level. *Nutrition Journal*, *13*(1), 33.

Sallis, J. F., Nader, P. R., Broyles, S. L., Berry, C. C., Elder, J. P., McKenzie, T. L., & Nelson, J. A. (1993). Correlates of physical activity at home in Mexican-American and Anglo-American preschool children. *Health Psychology, 12*(5), 390.

Sallis, J. F., Patterson, T. L., McKenzie, T. L., & Nader, P. R. (1988). Family variables and physical activity in preschool children. *Journal of Developmental & Behavioral Pediatrics, 9*(2), 57-61.

Silveira, J. A. C., Colugnati, F. A. B., Poblacion, A. P., & Taddei, J. A. A. C. (2015). The role of exclusive breastfeeding and sugar-sweetened beverage consumption on preschool children's weight gain. *Pediatric Obesity*, *10*(2), 91-97.

Smith, J. D., Montaño, Z., Dishion, T. J., Shaw, D. S., & Wilson, M. N. (2015). Preventing weight gain and obesity: Indirect effects of the family check-up in early childhood. *Prevention Science*, *16*(3), 408-419.

Sosa, E. T. (2012). Mexican American mothers' perceptions of childhood obesity: a theory-guided systematic literature review. *Health Education & Behavior*, *39*(4), 396-404.

Tatlow-Golden, M., Hennessy, E., Dean, M., & Hollywood, L. (2014). Young children's food brand knowledge. Early development and associations with television viewing and parent's diet. *Appetite*, *80*, 197-203.

The AHA's Recommendations for Physical Activity in Children. (n.d.). Retrieved from http://www.heart.org/HEARTORG/HealthyLiving/HealthyKids/ActivitiesforKids

/The-AHAs-Recommendations-for-Physical-Activity-in-Children_UCM_304053_Article.jsp#.WKH7uLGZNE4

The Lancet Diabetes & Endocrinology. (2014). Obesity prevention in Latin America: Now is the time. *The Lancet Diabetes & Endocrinology, 2*(4), 263.

Treviño, R. P., Vasquez, L., Shaw-Ridley, M., Mosley, D., Jechow, K., & Piña, C. (2014). Outcome of a Food Observational Study Among Low-Income Preschool Children Participating in a Family-Style Meal Setting. Health Education & Behavior, 1090198114550823.

Trevino, R. P., Yin, Z., Hernandez, A., Hale, D. E., Garcia, O. A., & Mobley, C. (2004). Impact of the Bienestar school-based diabetes mellitus prevention program on fasting capillary glucose levels: a randomized controlled trial. *Archives of Pediatrics &Adolescent Medicine, 158*(9), 911-917.

Trost, S. G., Sirard, J. R., Dowda, M., Pfeiffer, K. A., & Pate, R. R. (2003). Physical activity in overweight and nonoverweight preschool children. *International Journal of Obesity, 27*(7), 834-839.

Uauy, R., Albala, C., & Kain, J. (2001). Obesity trends in Latin America: Transiting from under-to overweight. *The Journal of Nutrition, 131*(3), 893S-899S.

Urke, H. B., Mittelmark, M. B., & Valdivia, M. (2014). Trends in stunting and overweight in Peruvian pre-schoolers from 1991 to 2011: Findings from the Demographic and Health Surveys. *Public Health Nutrition*, *17*(11), 2407-2418.

Vasquez, L., Shaw-Ridley, M., Baig, K.(2016). The intersection of place, working parents and food assistance: implications for preventing child and adolescent obesity. *California Journal of Health Promotion. 14*(2), 22-34.

Vollmer, R. L., & Mobley, A. R. (2013). A Pilot Study To Explore How Low-Income Mothers of Different Ethnic/Racial Backgrounds Perceive and Implement Recommended Childhood Obesity Prevention Messages. *Childhood Obesity, 9*(3), 261-268.

Webster, J. D. (2003). *Using a cultural model to assess female condom use in Mpumalanga, South Africa* (Doctoral dissertation, The Pennsylvania State University).

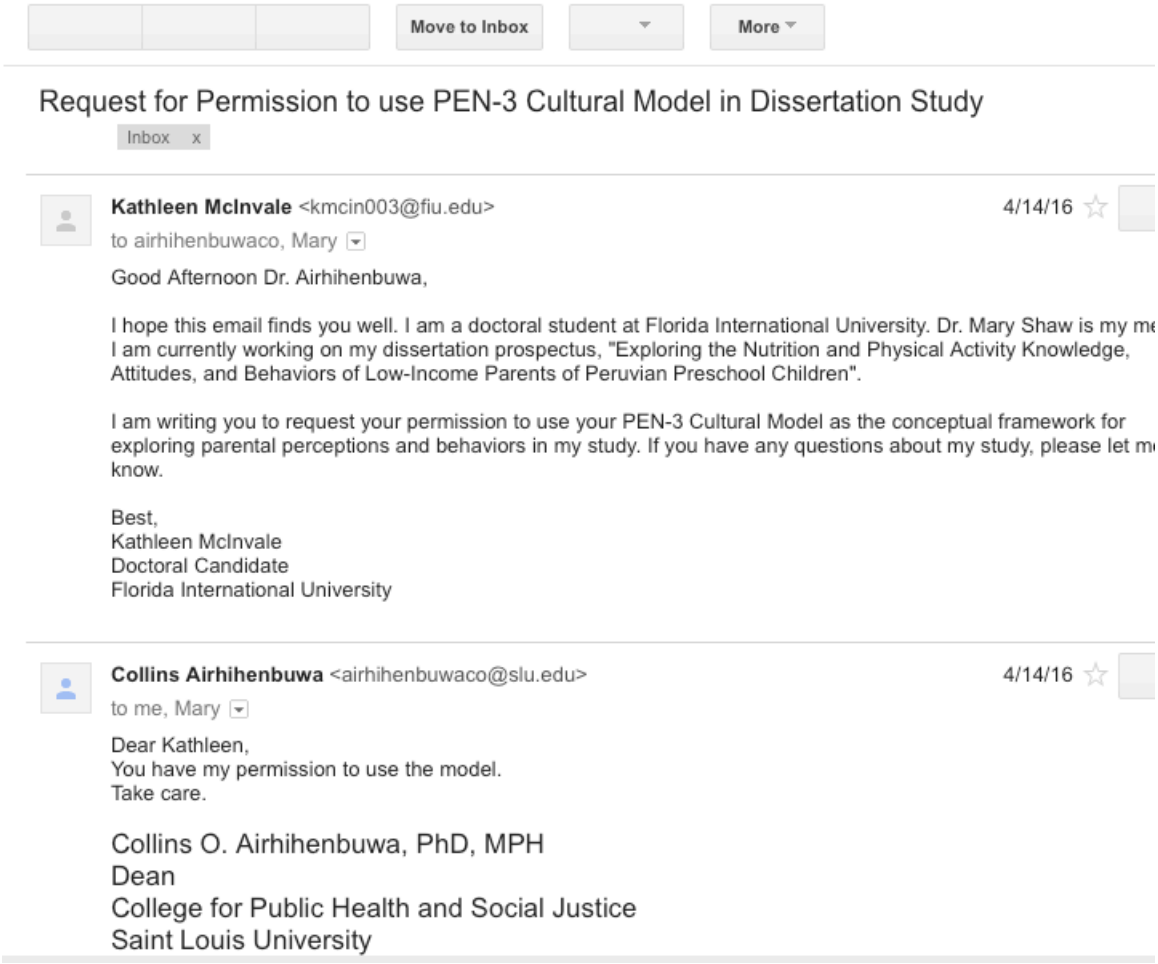
Weygandt, P., Vidal-Cardenas, E., Gilman, R., Avila-Tang, E., Cabrera, L. & Checkley, W. (2012). Epidemiology of tobacco use and dependence in adults in a poor peri-urban community in Lima, Peru. *BMC Pulmonary Medicine 12*(1), 9.

Weight-for-age Child growth standards. (2017). Retrieved from http://www.who.int/childgrowth/standards/en/

Williams, H. G., Pfeiffer, K. A., O'Neill, J. R., Dowda, M., McIver, K. L., Brown, W. H., & Pate, R. R. (2008). Motor skill performance and physical activity in preschool children. *Obesity, 16*(6), 1421-1426.

APPENDICES

Appendix 1-Permission to Use Pen-3 Model



Move to Inbox

More

Request for Permission to use PEN-3 Cultural Model in Dissertation Study

Inbox x

Kathleen McInvale <kmcin003@fiu.edu> 4/14/16

to airhihenbuwaco, Mary

Good Afternoon Dr. Airhihenbuwa,

I hope this email finds you well. I am a doctoral student at Florida International University. Dr. Mary Shaw is my me
I am currently working on my dissertation prospectus, "Exploring the Nutrition and Physical Activity Knowledge, Attitudes, and Behaviors of Low-Income Parents of Peruvian Preschool Children".

I am writing you to request your permission to use your PEN-3 Cultural Model as the conceptual framework for exploring parental perceptions and behaviors in my study. If you have any questions about my study, please let m
know.

Best,
Kathleen McInvale
Doctoral Candidate
Florida International University

Collins Airhihenbuwa <airhihenbuwaco@slu.edu> 4/14/16

to me, Mary

Dear Kathleen,
You have my permission to use the model.
Take care.

Collins O. Airhihenbuwa, PhD, MPH
Dean
College for Public Health and Social Justice
Saint Louis University

Appendix 2- Modified BAQ-HH in English and Spanish

Please read these statements and answers carefully. **Circle** the number for the answer that matches best.

1. In a typical day at home, about how many servings of sweetened drinks (juices, sodas, fruit punch, tea) does your child drink?

   a. 1 or none b. 2 c. 3 d. 4 or more

2. In a typical week, how often does your child eat fast food like burgers, fries, hot dogs, or nuggets?

   a. 1 time or less b. 2 times c. 3 times d. 4 times or more

3. In a typical week, how often does your child eat dinner with at least one parent?

   a. 1 time or less b. 2 or 3 times c. 4 or 5 times d. 6 or 7 times

4. In a typical day, how many meals does your child eat at home?

   a. None b. One c. Two d. Three or more

5. In a typical day, how many hours does your child spend in Preschool?

   a. None b. 4 hours or less c. 8 hours or less d. More than 8 hours

6. In a typical day at home, how much television or computer time does your child have?

   a. Less than 1 hour b. 1 to 2 hours c. 2 to 3 hours d. 3 or more hours

7. In a typical week, how many days does your child do something active (to the point of being out of breath) or walking, riding a bike, etc. for at least 30 minutes total per day at home?

   a. Zero or one day b. 2 or 3 days c. 4 or 5 days d. 6 or 7 days

8. I think that these issues matter for my family's good health:	**Strongly disagree**	**Disagree**	**Mildly disagree**	**Mildly agree**	**Agree**	**Strongly Agree**
The portion size of food.	1	2	3	4	5	6
The amount of sugar in food.	1	2	3	4	5	6
Eating fruits and vegetables.	1	2	3	4	5	6
Cutting down on sodas	1	2	3	4	5	6
Having healthy foods at home.	1	2	3	4	5	6
Balance eating with physical activity.	1	2	3	4	5	6
Cutting down on screen time: TV, computer, games.	1	2	3	4	5	6

9. I worry about…	**Strongly disagree**	**Disagree**	**Mildly disagree**	**Mildly agree**	**Agree**	**Strongly Agree**
My child eating too much when I'm not around.	1	2	3	4	5	6
My child having to diet to keep a good weight.	1	2	3	4	5	6
A lack of low cost and safe places for my child to be active.	1	2	3	4	5	6
A lack of physical activity or sports time for my child.	1	2	3	4	5	6

10. I usually…	**Never**	**Rarely**	**Occasionally**	**Often**	**Very Often**	**Always**

Decide my child's portion sizes.	1	2	3	4	5	6
Decide if my child is eating healthy foods.	1	2	3	4	5	6
Ask about what my child eats at school.	1	2	3	4	5	6
Serve meals at a regular time.	1	2	3	4	5	6
Serve fruits and vegetables with meals.	1	2	3	4	5	6
Eat meals with my child.	1	2	3	4	5	6
Talk about the value of a healthy diet.	1	2	3	4	5	6
Push my child to play outside.	1	2	3	4	5	6
Talk about the value of physical activity.	1	2	3	4	5	6

11. Things that make it hard to help my family's health are:

_____

_____

_____

12. Things I would like to do to improve the food and physical activity habits of my family:

_____

13. My gender is: ☐ Male ☐ Female

14. I am: ☐ less than 20 years old ☐ 20 – 29 years old ☐ 30 – 39 years old ☐ 40 years or older

15. I think of myself as the primary caregiver for my child:

☐ Yes ☐ No

16. The person responsible for preparing most of my family's meals is:

☐ Me ☐ My Spouse ☐ A grandparent ☐ Other

17. My highest level of school is:

☐ Primary School ☐ Some Secondary ☐ Secondary School graduate
☐ Some University ☐ University degree or beyond

18) Please circle the image you feel most closely resembles your child's weight:

19) I feel my child is...

a) very underweight
b) a little underweight
c) about the right weight
d) a little overweight
e) very overweight

20) Are you currently receiving information on healthy eating and/or physical activity for your family or children?

21) If you answered yes to the previous question, what is the source of that information (school, government, community organization or other- please indicate)?

22) If you answered yes to Question 20, do you find this information helps you to make healthy diet and physical activity decisions for your family or child?

Favor de leer estas declaraciones. **Encierre en un círculo** el número de la respuesta que mejor describa lo que usted piensa.

1. En un día típico en su casa, ¿cuántas porciones de bebidas azucaradas (zumos, refrescos, ponche de frutas, té) bebe su hijo?
   1. 1 o menos 2. 2 3. 3 4. 4 5. 5 o mas

2. En una semana típica, ¿con qué frecuencia come su hijo comida rápida como hamburguesas, papas fritas, hot dogs, nuggets?
   1. 1 o menos 2. 2 veces 3. 3 veces 4. 4 veces 5. 5 o mas

3. En una semana típica, ¿con qué frecuencia cena su hijo con al menos uno de los padres?
   1. 1 o menos 2. 2 o 3 veces 3. 4 o 5 veces 4. 6 o 7 veces

4. 4. En un día normal, ¿cuantas comidas su hijo(a) come en casa?
   1. Ninguna 2. Una 3. Dos 4. Tres o mas

5. En un día típico en su casa, ¿cuánto tiempo en la computadora o la televisión tiene su hijo?
   1. Menos de 1 hora 2. 1 a 2 horas 3. 2 a 3 horas 4. 3 a 4 horas 5. Más de 4

6. En una semana típica, ¿cuántos días hace su niño algo activo (hasta el punto de estar fuera de la respiración) o caminar, andar en bicicleta, etc. por lo menos 30 minutos en total por día en su casa?

1. Cero o un día 2. 2 o 3 días 3. 4 o 5 días 4. 6 ó 7 días

7. En un día normal, ¿cuantas hora pasa su hijo(a) en el prescolar?
   1. Ninguna 2. 4 horas o menos 3. 8 horas o menos 4. Más de 8 horas

8. Creo que estos asuntos son importantes para la buena salud de mi familia	Completamente en desacuerdo	No estoy de acuerdo	Estoy un poco en desacuerdo	Estoy un poco de acuerdo	Estoy de acuerdo	Estoy completamente de acuerdo
El tamaño de las raciones de los alimentos.	1	2	3	4	5	6
La cantidad de azúcar en los alimentos.	1	2	3	4	5	6
Comer frutas y verduras	1	2	3	4	5	6
Disminuir el consumo de gaseosas.	1	2	3	4	5	6
Tener alimentos saludables en casa.	1	2	3	4	5	6
Balancear la alimentación con la actividad física.	1	2	3	4	5	6
Disminuir el tiempo que pasamos frente a la pantalla: TV, computador, videojuegos.	1	2	3	4	5	6

9. Me preocupa…..	Completamente en desacuerdo	No estoy de acuerdo	Estoy un poco en desacuerdo	Estoy un poco de acuerdo	Estoy de acuerdo	Estoy completamente de acuerdo
Que mi hijo coma demasiado cuando yo no estoy.	1	2	3	4	5	6
Que mi hijo tenga que hacer dieta para mantener un peso adecuado.	1	2	3	4	5	6
Que existan pocos sitios bajos en costo y seguros en donde mi hijo	1	2	3	4	5	6

10. Yo normalmente…	Completamente en desacuerdo	No estoy de acuerdo	Estoy un poco en desacuerdo	Estoy un poco de acuerdo	Estoy de acuerdo	Estoy completamente de acuerdo
Decido el tamaño de las raciones de mi hijo	1	2	3	4	5	6
Decido si mi hijo consume alimentos nutritivos.	1	2	3	4	5	6
Me informo sobre los alimentos que mi hijo consume en la escuela	1	2	3	4	5	6
Sirvo de comer a la misma hora.	1	2	3	4	5	6
Sirvo frutas y verduras durante las comidas.	1	2	3	4	5	6
Como con mi hijo.	1	2	3	4	5	6
Hablo de la importancia de una dieta saludable.	1	2	3	4	5	6
Animo a mi hijo a jugar afuera.	1	2	3	4	5	6
Hablo sobre la importancia de la actividad física.	1	2	3	4	5	6

11. Las cosas que hacen difícil mejorar la salud de mi familia son:

12. Las cosas que me gustaría hacer para mejorar los hábitos alimenticios y actividad física de mi familia son:

13. Mi género es: ☐ Masculino ☐ Femenino

14. Yo tengo: ☐ menos de 20 años ☐ 20 – 29 años ☐ 30 – 39 años ☐ 40 – 49 años ☐ 50 – 59 años ☐ 60 años o más

15. El nivel más alto que completé en la escuela es:

☐ Primaria ☐ Preparatoria ☐ Technica
☐ Universidad ☐ Postgrado

16. Pienso en mi mismo(a) como el(la) principal cuidador(a) de mi hijo(a):

☐ Si ☐ No

17. La persona responsable de preparar la mayor parte de las comidas de mi familia es:

☐ Yo ☐ Mi conyugue ☐ Un abuelo(a) ☐ Otro

18. Por favor encierre en un circulo la imagen que usted piensa que más se asemeja al peso de su hijo(a):

19. Pienso que mi hijo(a) es...

a) muy por debajo del peso apropiado
b) un poco por debajo del peso apropiado
c) aproximadamente el peso apropiado
d) un poco por encima del peso apropiado
e) muy por encima del peso apropiado

20. ¿Actualmente esta recibiendo información sobre alimentación saludable y /o actividad física para su familia o hijos?

21. Si respondió afirmativamente a la pregunta anterior, ¿cual es la fuente de esa información (escuela, gobierno, organización comunitaria u otros, por favor indique)?_____
_____
_____
_____

22. Si respondió afirmativamente a la pregunta 21, ¿encuentra que esta información le puede ayudar a tomar desiciones de alimetacion y actividades físicas saludables para su familia o hijo(a)?

_____
_____
_____
_____

Appendix 3- Child Health Data Form in English and Spanish

Child Health Data Form

Identification Number_____

Student's First and Last Name _____

Date of Birth _____/_____/_____

Gender: M_____ F_____

Height (cm)_____

Weight (kg)_____

Date of Medical Exam _____/_____/_____

Formulario de Datos de Salud Infantil

Numero de Intificacion_____

Nombre y appellido del estudiante _____

Fecha de nacimiento _____/_____/_____

Sexo: H_____ M_____

Altura (cm)_____

Peso (kg)_____

Fecha de examen medico_____/_____/_____

Appendix 4- PRISMA (Lima, Peru) IRB Approval Letter

PRISMA

Lima, 21 de julio de 2016
CE1743.16

Doctora
Kathleen McInvale
Investigador Principal
Presente.-

Ref: Protocolo titulado: "Evaluación del Conocimiento de Nutrición y Actividad Física, Actitudes y Conductas de Padres de Niños Peruanos de Preescolar"

De nuestra consideración:

Es grato dirigirnos a usted a fin de informarle que el Comité de Ética ha revisado los cambios sugeridos y procede con la **APROBACIÓN** de los siguientes documentos del estudio en mención:

- **Protocolo de investigación, Versión: 23 de junio de 2016**
- **Consentimiento del Adulto para Participar en un Estudio de Investigación, Versión: 23 de junio de 2016**
- **Encuesta, Versión: 23 de junio de 2016**
- **Formulario de datos de salud infantil**
- **Carta de Reclutamiento para Padres**
- **Afiche del estudio de investigación**

Sin otro particular por el momento, nos despedimos de usted.

Atentamente,

Salomón Zavala Sarrio
Presidente
Comité de Ética

PRISMA ONG
Fundada como Asociación Benéfica Prisma el 23 de abril de 1986, según Partida Registral Nº 01885359 Asiento A00414.
Sede central: Calle Carlos Gonzales 251 Urb. Maranga, Lima 32 – Perú - Teléfono (51)(1) 2090400
Fax: (51)(1) 2090401 Apartado Postal 170070 E-mail: prisma@prisma.org.pe Web: www.prisma.org.pe

Appendix 5- Florida International University (Miami, Florida) IRB Approval Letter

FLORIDA INTERNATIONAL UNIVERSITY

Office of Research Integrity
Research Compliance, MARC 414

MEMORANDUM

To: Dr. Mary Shaw

CC: File

From: Maria Melendez-Vargas, MIBA, IRB Coordinator

Date: October 11, 2016

Protocol Title: "Exploring the Nutrition and Physical Activity Knowledge, Attitudes and Behaviors of Low-Income Parents of Peruvian Preschool Children"

The Social and Behavioral Institutional Review Board of Florida International University has approved your study for the use of human subjects via the **Expedited Review** process. Your study was found to be in compliance with this institution's Federal Wide Assurance (00000060).

IRB Protocol Approval #:	IRB-16-0390	**IRB Approval Date:**	10/05/16
TOPAZ Reference #:	104889	**IRB Expiration Date:**	10/05/17

As a requirement of IRB Approval you are required to:

1) Submit an IRB Amendment Form for all proposed additions or changes in the procedures involving human subjects. All additions and changes must be reviewed and approved by the IRB prior to implementation.
2) Promptly submit an IRB Event Report Form for every serious or unusual or unanticipated adverse event, problems with the rights or welfare of the human subjects, and/or deviations from the approved protocol.
3) Utilize copies of the date stamped consent document(s) for obtaining consent from subjects (unless waived by the IRB). Signed consent documents must be retained for at least three years after the completion of the study.
4) **Receive annual review and re-approval of your study prior to your IRB expiration date**. Submit the IRB Renewal Form at least 30 days in advance of the study's expiration date.
5) Submit an IRB Project Completion Report Form when the study is finished or discontinued.

Special Conditions: N/A.

For further information, you may visit the IRB website at http://research.fiu.edu/irb.

MMV/em

Appendix 6- Letter of Request for UGEL Ministry of Education Approval (Lima, Peru)

FIU | Robert Stempel College of Public Health & Social Work
FLORIDA INTERNATIONAL UNIVERSITY

Fecha: 28 Octubre, 2016

Sr. Luis Alberto Yataco
Director
UGEL 01- San Juan de Miraflores

Estimado: Sr. Luis Alberto Yataco,

Soy una estudiante de doctorado de la Universidad Internacional de Florida en Miami, Florida, Estados Unidos trabajando en Salud Pública. Estoy estudiando acerca de la creciente tasa de obesidad infantil en el Perú para mi tesis doctoral con la ayuda de la organización PRISMA.

La obesidad infantil es un problema nuevo de salud emergente en el Perú y se concentra principalmente en el área metropolitana de Lima. He optado por centrar mi estudio sobre los niños en edad preescolar porque la prevención de la obesidad es una de las estrategias más efectivas para combatir los efectos negativos para la salud de la obesidad y el sobrepeso. El gobierno peruano ha identificado la creciente tasa de obesidad infantil como un problema de salud pública importante para los peruanos, pero muy pocas investigaciones se han realizado hasta ahora.

Le escribo para pedirle permiso para poder realizar mi estudio en sus escuelas. El recojo de datos se llevará a cabo en Noviembre. Después del recojo de datos se analizarán y se prepararán los resultados del estudio. Me pondré en contacto con usted al finalizar mi análisis para compartir los resultados del estudio al comienzo del nuevo año escolar.

Sinceramente,

Kathleen McInvale, MPH
Doctoral Candidate
Florida International University
Robert Stempel College of Public Health & Social Work

Appendix 7-Ministry of Education UGEL 01 Letter of Approval for Research

PERÚ | Ministerio de Educación | Unidad de Gestión Educativa Local Nº 01 San Juan de Miraflores | Dirección | Área de Supervisión y Gestión del Servicio Educativo

"Año de la Consolidación del Mar de Grau"
"Decenio de las Personas con Discapacidad en el Perú 2007– 2016"

CONSTANCIA DE PRESENTACION

El Director de la Unidad de Gestión Educativa local N°01-San Juan de Miraflores, que suscribe;

Presenta a:

*La Doctora **Kathleen Elaine McInvale**, identificada con Pasaporte N° 489198568, egresada de Doctorado, de la Universidad Internacional de Florida en Miami, quien se encuentra desarrollando una investigación para su tesis **"La creciente tasa de obesidad infantil en el Perú"**, a fin que se le otorgue facilidades en la aplicación de los instrumentos a los Estudiantes y Padres de Familia del Nivel de Educación Inicial de las siguientes II.EE:*

DIVINO NIÑO JESUS DE PRAGA N° 643
INICIAL CUNA JARDIN N° 525 REYNA DEL CARMEN
I.E.P REYNA DE LOS ANGELES VILLA ALEJANDRO
NUESTRO SALVADOR JOSE GALVEZ
I.E.P JOSE ABELARDO QUIÑONES DE LURIN
IE.I. N° 532 SAN MARTIN DE PORRES
I.E.I.N° 624 VIRGEN DEL CARMEN
INCIAL MISS FRIDA JOSE GALVEZ.
de la jurisdicción de la UGEL 01-Lima Sur.

Se expide la presente constancia para los fines estrictamente señalados.

San juan de Miraflores, 09 de Noviembre del 2016.

DIRECCIÓN REGIONAL DE EDUCACIÓN DE LIMA METROPOLITANA – Unidad de Gestión Educativa Local N° 01 – DIRECCIÓN

Mg. LUIS ALBERTO YATACO RAMIREZ
DIRECTOR DE LA UNIDAD DE GESTIÓN EDUCATIVA LOCAL Nº 01
SAN JUAN DE MIRAFLORES

UGEL N° 01 SJM – ASGESE

KEAOM/J.(e) ASGESE.
ECPC/C.(e)ASGESE
KEFH/E. ASGESE/ESIE

Appendix 8-Parent Invitation Letter in English and Spanish

Parent Recruitment Letter (English)

(Date)

Dear Parent/Guardian,

We need your help to keep our kids healthy! (Pre-School Name) is working with a researcher from Florida International University in Miami, Florida, United States, in conjunction with the PRISMA Organization in Lima, Peru on a study of Peruvian preschool children's healthy eating and physical activity habits.

We are asking parents of three and four year old children to complete a short survey during the upcoming parent-teacher conferences at (School Name) scheduled on (DATE). The survey will take about 10 minutes to complete and will ask questions about your child and family's eating and physical activity habits. Additionally information about child's age, height and weight will be collected from the school records. All responses and data will be kept confidential and only reported as group data.

Thank you for your help! If you have any questions, please let us know.

We welcome your questions!

Kathleen McInvale, kmcin003@fiu.edu

Carta de Reclutamiento para Padres

Estimado Padre/Tutor,

Necesitamos su ayuda para mantener a nuestros niños saludables ! Tu Colegio está trabajando con una investigadora de la Universidad Internacional de Florida (FIU) en Miami, Florida, Estados Unidos, en conjunto con la organización PRISMA de Lima, Perú, en un estudio de niños peruanos de edad preescolar sobre la alimentación saludable y los hábitos de actividad física.

Estamos pidiendo a los padres completar una breve encuesta. La encuesta le tomará aproximadamente 10 minutos para completar se le hará preguntas sobre su hijo y familiares acerca de alimentación y hábitos actividad física . Adicional información sobre la edad, la altura y el peso del niño se obtendran de los registros escolares . Todas las respuestas y los datos serán confidenciales y sólo se informaran como datos del grupo.

¡Gracias por su ayuda! Si tiene alguna duda, por favor póngase en contacto con nosotros.

Aceptamos y agradecemos a sus preguntas!

Kathleen McInvale kmcin003@fiu.edu

Appendix 9- Parent Recruitment Flyer in English and Spanish

Are you a parent of 3 or 4 year old child? We need your help !

We are currently conducting a research study in Lima, Peru exploring Peruvian parent's behaviors and perceptions about healthy eating and physical activity for their preschool children.

- If you are the parent of a three or four year old child attending this preschool you are eligible to participate.
- You will be invited to participate during the upcoming Parent - Teachers conferences.
- The study will take 10 minutes of your time to complete, and all of your answers will be kept confidential.

If you have any questions, or would like to learn more about this research study please contact :

Katie McInvale
Kmcin003@fiu.edu

¿Eres padre de un niño de 3 o 4 años? ¡Necesitamos tu ayuda!

Estamos llevando a cabo un estudio de investigación en Lima Peru observando los comportamientos y percepciones de los padres de familia sobre la alimentación saludable y la actividad física para su niños de en edad preescolar.

- Si usted es el padre de un niño de tres o cuatro años que asiste a este centro de estudio eres elegible para participar.
- Estas invitado a participar durande la reunión de padres de familia.
- El estudio durara 10min de tu tiempo, todas las preguntas seran confidenciales.

Si tienes alguna inquietud o pregunta y te gustaria aprender mas acerca de este estudio de investigación contactanos.

Katie McInvale
Kmcin003@fiu.edu

VITA

KATHLEEN MCINVALE

2008	B.S. Biology University of Miami Coral Gables, Florida
2011	M.P.H., Public Health University of Miami Miami, Florida
2010-2011	National Science Foundation Fellow University of Miami Coral Gables, Florida
2011-2012	Research Assistant University of Miami Miami, Florida
2012-2016	Doctoral Candidate Florida International University Miami, Florida
2012-2015	Research Assistant Florida International University Miami, Florida
2014	21st Century Scholarship Recipient 65th Annual SOPHE Conference Baltimore, Maryland
2015	Tinker Grant Awardee Florida International University Miami, Florida
2016	Interventionist Miami Dade County Public Schools Miami, Florida

PUBLICATIONS AND PRESENTATIONS

Shaw-Ridley, M., Salerno, K., McInvale Trejo, K., Gabbidon, K., Ridley, C. (2016). Family crisis coping, mood, and decision making among african-american breast cancer survivors. Manuscript submitted for publication.

Shaw, M., Baker, M., Sorondo, B., Reifer, C. Bhoite, P., McInvale Trejo, K. (2017) Characterizing type 2 diabetes primary prevention programs for african-americans: A systematic review of the literature Manuscript in preparation.

McInvale Trejo, K**.,** Shaw, M. (2017). Perceptions of weight status among parents of pre-school children in a low-income population in Lima, Peru. Roundtable Discussion Presented at the 68th Annual Meeting of the Society for Public Health Education, Denver, CO.

McInvale Trejo, K. , Shaw, M. (2017). Nutrition and physical activity knowledge, attitudes and behaviors of parents of overweight and healthy weight Peruvian preschool children. Poster Presented at the Florida International University Graduate Scholarly Forum, Miami, FL.

Shaw, M., McInvale Trejo, K. (2017, April). Perceptions about family crisis coping among African-American breast cancer survivors: Implications for quality of life Poster accepted for presentation at the 25th Anniversary Congress on Women's Health, Washington, D.C.